A STUDY TO ASSESS THE EFFECTIVENESS OF CRYOTHERAPY ON LEVEL OF PAIN DURING ARTERIOVENOUS FISTULA VEIN PUNCTURE AMONG PATIENTS UNDERGOING HEMODIALYSIS IN A SELECTED HOSPITAL AT KERALA

COIMBATORE

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

OCTOBER 2018

A STUDY TO ASSESS THE EFFECTIVENESS OF CRYOTHERAPY ON LEVEL OF PAIN DURING ARTERIOVENOUS FISTULA VEIN PUNCTURE AMONG PATIENTS UNDERGOING HEMODIALYSIS IN A SELECTED HOSPITAL AT KERALA

BY

JEYA SINGH .V

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

OCTOBER 2018

A STUDY TO ASSESS THE EFFECTIVENESS OF CRYOTHERAPY ON LEVEL OF PAIN DURING ARTERIOVENOUS FISTULA VEIN PUNCTURE AMONG PATIENTS UNDERGOING HEMODIALYSIS IN A SELECTED HOSPITAL AT KERALA

APPROVED BY THE DISSERTATION COMMITTEE ON.....

RESEARCH GUIDE.....

Dr.Mrs.S.SELVAKUMARI MA, M.Phil, Ph.D.,
PROFESSOR IN RESEARCH METHODS,
ANNAI MEENAKSHI COLLEGE OF NURSING,
COIMBATORE.

CLINICAL GUIDE…….....

Mrs.C.ESWARI,M.Sc(N).,
PROFESSOR & HOD DEPT OF MEDICAL SURGICAL NURSING,
ANNAI MEENAKSHI COLLEGE OF NURSING,
COIMBATORE.

MEDICAL EXPERT…….....

Prof. Dr. R. GANDHIMOHAN, MD, DM (NEPHRO).,
CONSULTANT NEPHROLOGIST, (REG NO: 54143),
COIMBATORE MEDICAL COLLEGE AND HOSPITAL,
COIMBATORE.

A DISSERTATION SUBMITTED TO THE TAMILNADU
Dr. M. G. R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL
FULFILMENT OF REQUIREMENT FOR THE DEGREE OF
MASTER OF SCIENCE IN NURSING
OCTOBER-2018

CERTIFIED THAT THIS IS THE BONAFIDE WORK OF

JEYA SINGH .V

ANNAI MEENAKSHI COLLEGE OF NURSING,

COIMBATORE, TAMILNADU.

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT

FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

TO THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY,

CHENNAI

COLLEGE SEAL:

Prof. Mrs. M. MUMTAZ, M.Sc(N).,MBA (HM)., M.Phil.,

PRINCIPAL,

ANNAI MEENAKSHI COLLEGE OF NURSING,

COIMBATORE, TAMIL NADU.

TABLE OF CONTENTS

[Contd…]

[Contd.,]

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACKNOWLEDGEMENT

"Knowledge is the end based on acknowledgement''

Ludwig Wittgenstein- 1889

I wish to acknowledge my heartfelt gratitude to the Lord Almighty for all the wisdom, Knowledge, guidance, strength, protection, shield and support. He has offered me throughout this endeavor and given me courage to overcome the difficulties and thus complete this study successfully.

I honestly express my sincere gratitude to all the study participants who extended their co-operation throughout my study period

I express my sincere thanks to Mr. A. KARUPPAIAH D.Pharm, **Correspondent** of our college, for giving me an opportunity to study in this esteemed institution.

"Things do not turn up in this world until somebody turns them up" I express my sincere respectful and wholehearted gratitude to **Our Principal** Prof.Mrs.M.MUMTAZ MSC (N), MBA, M Phil., for her constant support, encouragement and guidance in all my endeavors. It is my great honor and privilege to have completed this study under her guidance. Words are insufficient to offer thanks for her incomparable love.

An excellent teacher is a complex matrix of builder, artist, leader and harvester. I would like to express my immense gratitude and whole hearted thanks to Prof. Mrs. C. ESWARI, MSC (N) **HOD of Medical Surgical Nursing cum Clinical Guide**, for her insisting support, constructive suggestions and immense

encouragement which enabled me to reach my objective. I consider it as a great honour and privilege to have completed my study under her supervision.

I proudly express my sincere thanks to **Research Guide** Dr.Mrs.S.SELVAKUMARI MA, M.Phil, Ph.D for her patience and time in checking and rechecking the manuscripts and for sharing his suggestions and constructive criticisms, meant so much for the completion of the study.

I thank to my **Medical Guide** Prof. Dr. R. GANDHIMOHAN, MD, DM Chief consultant Nephrologist, Government Hospital Coimbatore, for his excellent guidance and support, for his kind consent to the most difficult task of my performance and his expert guidance, valuable suggestions, and constructive criticisms, which meant so much for the study.

My grateful thanks to my **Class Coordinator** Mrs. K . KOGHILA MSc(N), for his excellent guidance and support. I consider it as a great honour and privilege to have completed my study under her supervision.

I fail on my duty if I forget to be faithful to my teachers Mrs.RAMYA.M.Sc.(N), Ms.B.UDHAYAJAYANTHI.MSc(N), and Ms.G.MARUTHU.MSc(N), for their genuine help, motivation and healthy suggestions for the beginning till the end of the study in all aspects. Endless thanks from my inner heart for them.

I am highly obliged to the dynamic and eminent personality, Mr.H.MANSOOR HAJI, Chairman of MIMS - THANAL Dialysis Centre, Vadakara, Calicut for having allowed me to conduct the study and also for the facilities provided.

I wish to thank Dr. BENIL H. MD, Dialysis Unit In charge, MIMS - THANAL Dialysis Centre for his valuable support and guidance. I extend my sincere thanks to all STAFFS who offered timely support and guidance in conducting this study.

I wish to thank Mr. Thomas Kutty, B.Sc (N) (Staff Nurse) Dialysis Unit Duty In charge, MIMS – THANAL Dialysis Centre for his valuable support and guidance in dialysis unit procedures.

I extend my heartfelt gratitude to Mr. NIMMYA FRANCIS HR, MIMS – THANAL Dialysis Centre, Vadakara, Calicut, for assessed me in availing permission from the management to conduct the study.

My sincere thanks to Mr.ANNASAMY M.Phil, for extending their helping hands in the course of analysis of the data collected and its interpretations.

My special thanks to all the experts those who validated the study content and research tool.

I offer my gratitude to our librarian Mrs. SULOCHANA, ML.ISc for helping me in collecting reviews for the study.

I express my gratitude to Mr. ARPUTHAM, ANNS IT INTERNET CAFE, Podanur for computing the manuscript clearly, legibly and effectively with in short time as we requested.

I take this golden opportunity to thank my beloved parents, brothers and friends who have been the foundation for my success in my educational enduration.

ABSTRACT

Introduction

Pain is one of the most frequent complaints of patients during ArterioVenous fistula vein puncture. Pain inflicted by insertion of large cannula into ArterioVenous fistula on regular hemodialysis is a significant cause of concern for both children and adult patients. Pain is unpleasant sensory and emotional experience associated with actual or potential damage of tissue with physiological or psychological responses.

Statement Of The Problem

A Study to Assess The Effectiveness Of Cryotherapy On Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In A Selected Hospital At Kerala.

Objectives

The objectives of this study were:

- To assess the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group and Control Group.
- To evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group.
- To determine the association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group.

Hypothesis

H_1 - There is a significant difference in the post-test level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental group & Control group.

H_2 - There is significant association between level of pain during ArterioVenous Fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group.

Research Design

The research design adopted was quasi experimental pretest posttest design with control group. The conceptual framework for this study was based on Modified Katharine Kolcaba's theory of comfort (1994).

Sample

Non probability purposive sampling technique was adopted to select the desired samples. The samples were selected from MIMS – THANAL Dialysis Centre, Vadakara, Calicut. There are 30 samples in each experimental group and control group.

Intervention

Cryotherapy is a cold application done with ice cubes wrapped in a glove on the web between the thumb and index finger of the hand not having ArterioVenous Fistula (Contra Lateral Arm) started 10 minutes before the puncturing procedure and continued throughout the procedure.

Tool

The Standardized Numerical Pain Assessment Scale was used to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture

Result

The collected data were analyzed by using both descriptive and inferential statistical methods. The obtained ‘t’ value was 20.52 which is highly significant at $p<0.05$ level. The ‘t’ value 20.52 is greater than table value (1.671).

Conclusion

Cryotherapy was resulted in reducing the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

Keywords : Cryotherapy, Pain, ArterioVenous Fistula Vein Puncture, Patients undergoing hemodialysis.

CHAPTER – I

INTRODUCTION

Background Of The Study

The kidney is such an important organ, it is essential for the maintenance of a healthy body. The kidneys are the principal organs of the urinary system. The primary functions of the kidneys are to regulate the volume and composition of extracellular fluid (ECF) and to excrete waste products from the body. In addition, the kidneys function to control blood pressure (BP), produce erythropoietin, activate vitamin D, and regulate acid-base balance. Consequently, we unknowingly distress this vital organ, mainly through poor life style habits and choices. Kidneys are the powerful organs work on a continuous basis, ridding the body of harmful toxins. They are unbelievably important and if they become damaged or diseased, life will be changed significantly. Kidneys play a crucial role in maintaining homeostasis and overall health.

Chronic Kidney Disease is now the third most common non-communicable disease in India. Chronic renal failure is a devastating medical, social, and economic problem for both patients and their families in India. Most Chronic Kidney Diseases patients reporting to tertiary care centers in India are in the final stage where renal replacement therapy (RRT) is the only option at that stage. **(Sabitha PB 2008)**

Hemodialysis (HD) is the most frequently used renal replacement therapy with the ArterioVenous Fistula (AVF) being the “Gold Standard” for vascular access in hemodialysis (HD) patients. Chronic Kidney disease involves progressive, irreversible loss of kidney function. It is defined as either the presence of kidney damage or

Glomerular filtration rate (GFR) <60 ml/min for 3 months or longer dialysis or a kidney transplant is required to survive**.(Monhan F 2004)**

Hemodialysis is a life-saving procedure which removes blood from the body, circulates it through a purifying dialyzer and then returns the blood to the body. Various access sites can be used for this procedure. The most common access device for long-term treatment is an ArterioVenous fistula. A survey conducted by Dr. Mini Sun Park (2012) estimated that about 2, 00,000 persons suffer end stage renal disease every year in India. There are 700 dialysis centers with a total of 4000 dialysis machines. There are around 170 government recognized transplant centers in India, performing around 3500 transplants annually,in which about 14,500 patients are undergoing Hemodialysis.**(Fareed AP 2014)**

Pain inflicted by insertion of large cannula into ArterioVenous fistula on regular hemodialysis is a significant cause of concern for both children and adult patients. Pain is unpleasant sensory and emotional experience associated with actual or potential damage of tissue with physiological or psychological responses. When pain was surveyed; it was found that 90% of adult expressed pain because of needle based procedure. Although ArterioVenous fistula puncturing causes pain, local anesthesia is not frequently used due to concerns of vasoconstriction, burning sensation, scarring and infection. **(Çelik G 2011)**

Studies have also thrown light on the fact that cold therapy (Cryotherapy) is one of the effective cutaneousstimulation techniques in alleviating pain. Cryotherapy is defined as the use of a substance that applied to the body to decrease tissue temperature. It was clarified that cryotherapy is used for treatment of pain by slowing nerve conduction rate and blocking nerve impulses through lowering the temperature

over the affected area. It also relaxes muscles, decrease capillary permeability by vasoconstriction and slow cellular metabolism. The most effective site of cutaneous stimulation is contralateral to the pain. The cold application can be delivered by cold packs, ice massage or spray. **(Hughes J 2008, Fareed AP 2014)**

Need for the Study

According to the World Health Organization (WHO) Global Burden Of Disease Project, disease of the kidney and urinary tract contribute to approximately 8,50,000 death every year.

WHO estimates that Chronic Kidney Disease is the 12^{th} leading cause of death and 17^{th} cause of disability. In India, the projected number of deaths due to Chronic Kidney Disease will rise from 3.78 million in 1990 to an expected 7.63 million in 2020. The treatment modalities for End Stage Renal Disease are hemodialysis, peritoneal dialysis and renal transplantation.

Vascular accesses for hemodialysis are ArterioVenous Fistula, ArterioVenous Graft which are permanent access and venous catheter which is a temporary access. On an average, a patient on maintenance hemodialysis undergoes ten ArterioVenous fistula punctures a month and would continue to do so throughout their life time or until a successful renal transplant. Patient's comfort with the procedure is therefore of utmost important for long-term compliance with the treatment.

In September 2008, the world health organization (WHO) estimated that nearly 80% of the population in the world has either insufficient or no access to moderate or severe pain treatment. Every year millions of people around the world

suffer from pain without sufficient treatment. Patients undergoing HD are repeatedly exposed to pain due to insertion of large gauge needle into the fistula.

Anupama (2012) report in her study that the prevalence of Chronic Kidney disease at the community level is 8600 per million population in the study group and 13900 per million populations in the control group, patients with end-stage renal disease undergoing hemodialysis are repeatedly exposed to stress and pain from approximately 300 punctures per year to their AVF.

Ricci and Kyle (2009) listed strategies for pain management to include pharmacological and non-pharmacological intervention. The non-pharmacological approaches are essential component of pain relieve that include relaxation technique, visual imagery, behavioral cognitive strategies and biophysical interventions such as massage, pressure, and cutaneous electrical nerve stimulation through either heat or cold application. Although most of nurses have a commitment in pain reduction, fewer of them work for alleviation. Effort on pain management from health professionals at all department levels should be implemented as an important measure toward changing in effective pain management practices. Cutaneous stimulation is defined as stimulation of the skin and under lying tissues for the purpose of decreasing undesirable signs and symptoms such as pain, muscle spasm or inflammation. It also referred to as peripheral technique; describe any form of stimulation of the skin with the goal of pain relief. There are many different methods of cutaneous stimulation such as pressure, massage, heat, and/ or cold application.

Research evidence shows that cutaneous stimulation is an independent nursing intervention that is advocated to minimize the pain. The large intestine meridian is an acupressure point located on the back side of the hand between the thumb and the

index finger. The energy meridian pathway is bilateral and begins in the surface of the skin at the root of the finger nail. It applies on the external part of the arm. The outward end of the shoulder blade is crossed. Then the meridian leaves the skin surface to connect with the lower part of the lungs and transverse colon. It then returns to the skin surface of the chin. Its dominant uses are to relieve pain in the shoulder and arm, rigidity of neck, scapula, and eye diseases.

Patients with end-stage renal disease undergoing hemodialysis are repeatedly exposed to pain from approximately 300 punctures per year to their AV Fistula associated with the insertion of large-gauge needles. Nurses play a pivotal role in pain assessment and intervention. The complementary therapies are used to relieve the symptoms of pain. One of these therapies, which are used to reduce the pain, is cryotherapy.

Cryotherapy is Greek word in which ‘cryo’ means “cold”, and ‘therapy’ means “to cure”. Cryotherapy is a treatment in which the patients are exposed to extreme cold for short duration. The immediate effect of skin cooling and analgesia lasts for 5minutes by the release of endorphins can have lasting effect, where the pain and signs of inflammation are found suppressed for a week.

Cryotherapy induces its effects both locally and at the level of the spinal cord. The conduction rate of touch stimulus is more and the large intestine meridian point is the acupressure points present in arms, extending up to the nose. There are 20 large intestine meridian points. L14 is the point present on the medial midpoint of the first metacarpal between 2 to 4 mm of the web of skin between thumb and fore finger on either hand. Its dominant users are to relieve pain in arms, legs and scapula for reducing labor pain and rigidity of neck as a treatment measure.The topical cold

treatment reduces the temperature of the skin and under lying tissues to the depth of 2-4cm, decreasing activation threshold of tissue nociceptors and the conducting velocity of pain nerve signals which results in a local anesthetic effect call cold induced neuropraxia. JS Park, Taehans Kanho (1994)

Ice massage reduces sensation, including pain sensation, by slowing the transmission of sensory message from local nerve fibers to the brain. It reduces the inflammation. It slows the transmission, motor massage the train to the local nerve fibers known as cryostretch.

Studies have thrown light on the fact that cryotherapy is equally effective in alleviating pain as a cutaneous stimulation technique. This study is therefore under taken to look at the effect of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

Nurses are care giver for patients are obligated to minimize the emotional and physical effects of painful procedures. The investigator felt that nurses in these departments can make major contribution to the patients by reducing pain in the fistula site. Hence the researcher is interested in evaluating the simple, cost effect, easy to administer intervention cryotherapy to reduce level of pain during ArterioVenous fistula vein puncture. The nurse have important role in providing right patient care and comfort by helping and teaching patient how to apply cryotherapy. The nurse also works with the patient during the application starting from preparation, application with continuous observation for the patient's tolerance to the procedure. The study was under taken to examine the effect of cryotherapy on reducing the level of pain during ArterioVenous fistula vein puncture among Hemodialysis patients**.**

Statement of the Problem

A Study to Assess The Effectiveness Of Cryotherapy On Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In A Selected Hospital At Kerala.

Objectives

- To assess the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group and Control Group.
- To evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group.
- To determine the association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group.

Hypothesis

H_1 - There is a significant difference in the post-test level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in experimental group & control group.

H_2 - There is significant association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group.

Operational Definitions

Effectiveness

In this study effectiveness is referred to the outcome of cryotherapy in reducing the level of pain during the ArterioVenous fistula vein puncture among patients undergoing hemodialysis, which is measured by the Standardized Numerical Pain Assessment Scale.

Cryotherapy

In this study cryotherapy is a cold application done with ice cubes wrapped in a glove on the web between the thumb and index finger of the hand not having ArterioVenous fistula (Contra Lateral Arm) started 10 minutes before the puncturing procedure and continued throughout the procedure.

ArterioVenous Fistula

In this study ArterioVenous fistula is the connection of a vein and artery usually in the fore arm and upper arm, to allow access to the vascular system for hemodialysis as a treatment of chronic renal failure.

Vein Puncture

In this study vein puncturing is referred to puncturing of ArterioVenous fistula vein by a needle to withdraw the blood for dialysis and to reinfuse the cleaned blood into the body.

Pain

In this study Pain is referred as an unpleasant subjective sensory and emotional experience associated with ArterioVenous fistula vein puncture which is measured by Standardized Numerical Pain Assessment Scale.

Hemodialysis

In this study hemodialysis is referred to a medical procedure that uses a dialysis machine to filter waste products from the blood and to restore normal constituents to it.

Assumptions

- Due to frequent ArterioVenous fistula vein puncture patient had experience severe pain
- Cryotherapy promotes comfort to patients on ArterioVenous fistula vein puncture related pain.
- Cyotherapy is a simple measure to reduce level of pain during ArterioVenous fistula vein puncture.

Delimitation

- The data collection period is limited to six weeks.
- It has limited number of patients in a particular hospital.

Projected Outcome

- The Study will help the nurses to assess the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis with the use of Standardized Numerical Pain Assessment Scale.
- The Study will help the nurses to identify the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture.
- The study findings will help the nurses to practice cryotherapy as an intervention for reducing level of pain during ArterioVenous fistula vein puncture.
- The study's findings will help to improve the quality of life among patients with ArterioVenous fistula vein puncture related pain.

CHAPTER - II

REVIEW OF LITERATURE

"Every human being is the author of his own health or disease"

The review of literature in a research report is a summary of current knowledge about practice problem (Nancy and Burns 2002). A literature review is an organized written presentation of what has been published on a topic by the scholars. The task of reviewing literature involves the identification, selection, critical analysis and reporting of existing information on the topic of interest.

Review of Literature is discussed under the Following Headings

The literature found relevant and useful for the present study has been organized under the following headings.

- Studies related to pain during ArterioVenous fistula vein puncture.
- Studies related to effectiveness of Cryotherapy on level of pain.
- Studies related to effectiveness of Cryotherapy on level of pain during ArterioVenous fistula vein puncture.

Studies Related to Pain During ArterioVenous Fistula Vein Puncture

Alan Paul et.al., (2015) conducted a descriptive study in Spain to evaluate the pain among 27 hemodialysis patients by using Visual Analog Scale. It was concluded that pain in hemodialysis is very frequent and several differences appear between intradialytic and chronic pain.

Figueired.A.E. et. Al.,(2014) had conducted a prospective study in Brazil to evaluate the pain among hemodialysis patient. The study revealed that patients with ESRD undergoing hemodialysis are repeatedly exposed to stress and pain from approximately 300 punctures per year through their ArterioVenous Fistula. Repeated ArterioVenous Fistula Vein Punctures lead to a considerable degree of pain due to caliber & length of the level of fistula needle.

Jori Calls Ginesta et.al.,(2013) conducted a prospective cohort study in Canada to evaluate the prevalence of pain among hemodialysis patients. The patients were asked to complete the questionnaire that was incorporated with brief pain Inventory. The result revealed that 50% of patients reported pain during hemodialysis and is not being effectively managed. The study concluded that development of effective pain management strategies, appropriate education, is necessary to improve the quality of life for hemodialysis patients.

Donald Schon et.al,(2013) conducted a prospective study to assess the prevalence of ArterioVenous Fistula usage and pain during hemodialysis. The study concluded that button hole technique cannulation is less painful and allowing patients to eliminate the use of anesthetics.

Crespo Montero R., Edtna Erca J., (2012) had conducted an experimental study in Spain to evaluate the effect of needle bevel position on the degree of pain and skin damage in an ArterioVenous Fistula Vein Puncture, among 48 hemodialysis patients by using analogue visual scale and descriptive verbal scale. The study concluded that pain was greatest when the needle was punctured with the bevel facing upward rather than downward.

Linda D. Urden et al., (2012) Hemodialysis requires access to the blood stream. Various types of temporary and permanent devices are in clinical use. The ArterioVenous fistula is created by surgically visualizing a peripheral artery and vein and joining the two vessels together. The high arterial flow creates a swelling of the vein, or a pseudo aneurysm, at which point a large bore needle can be inserted to obtain arterial outflow to the dialyzer. In flow is accomplished by the second large bore needle inserted in to peripheral vein distal to the fistula. If the patient's vessels are adequate fistulas are the preferred mode of access because of the durability of blood vessels, relatively few has complications and less need for revision compared with other access methods.

Dorothy, et al. (1995) ArterioVenous fistula is formed by the anastomosis of an artery and a vein. The most commonly used vessels are the radial or brachial artery and cephalic vein of the non dominant arm. This process increases the blood flow through the vein to 250-400ml/mt, the most required for dialysis to be effective. Sometime is necessary for an ArterioVenous fistula to develop and the amount of time required for the fistula to mature varies. Primary fistula may not be suitable for as long as 4 months. Therefore vascular access must be planned accordingly.

Donna D. Ignatavicius et al., (1991) for hemodialysis to be performed, a vascular access route is required. Dialysis treatments necessitate the easy availability of large amount of blood flow, at least 250 to 350ml/mt, usually for a period of 3-4 hours. Normally the body cannot provide this type of circulatory access without surgical revision of blood vessels. An internal access is preferred for most clients undergoing long term hemodialysis. There are two common choices, an internal ArterioVenous fistula and ArterioVenous Graft.

Studies Related to Effectiveness of Cryotherapy on Level of Pain

Andrew.L, et.al., (2016) conducted a retrospective study in USA to evaluate the effectiveness of trans catheter cryotherapy for the treatment of Supra Ventricular Tachyarrhythmia's among 81 children. The study concluded that cryoablation is a safe and effective alternative for the treatment of Supra Ventricular Tachyarrhythmia's in children.

Rusciani.L, et.al,(2016) conducted a retrospective study in Italy to evaluate the efficacy of cryotherapy in the treatment of keloids among 135 patients. The study concluded that cryotherapy is the most effective, safe, economic and easy to perform monotherapy to treat keloids.

Gore.J.L,et.al., (2015) conducted a descriptive study in USA to evaluate the effectiveness of cryotherapy on renal tumors among 4 patients who underwent laparoscopy assisted percutaneous cryotherapy to treat small renal tumors. The study concluded that laparoscopy assisted percutaneous cryotherapy is a feasible treatment option for small renal tumor.

Powell.T, et.al, (2015) conducted a retrospective study in USA to evaluate the development of minimally invasive approaches to renal cell carcinoma such as renal Cryotherapy among 25 patients with small peripheral renal lesion. The study concluded that renal Cryotherapy is a viable option for nephron sparing surgery in small peripheral renal lesions and the procedure is well tolerated in patients who are not good candidates for open surgical approaches.

Quattrin.R, et.al., (2015) has conducted a quasi-experimental study in USA to evaluate the use of ice massage of the acupressure energy meridian point large intestine 4 (LI4) to reduce labor pain during contractions among antenatal mothers by

using Visual Analog Scales (VAS) and the McGill Pain Questionnaire. The study results suggest that ice massage is a safe, non-invasive, non-pharmacological method of reducing labor pain.

Laureano Filho.J.R, et. al.,(2015) conducted a preliminary study in Brazil to evaluate the effectiveness of cryotherapy among 14 patients in reducing undesirable consequences after mandibular third molars extraction at different times. Wilcoxon non-parametric signed rank test was used to assess the pain level. The result has shown that cryotherapy was effective in reducing swelling and pain in patients with tooth extraction.

Melzack.R.S, et.al.,(2015) conducted an experimental study in Canada to evaluate the effectiveness of cryotherapy on dental pain reduction among 40 patients at OP dental clinic by using Visual Analogue Scale. The study concluded that the cryotherapy is a safe procedure for dental pain reduction.

Singh. H, Osbahr. D.C, (2014) had conducted prospective randomized study in USA to evaluate the efficiency of cryotherapy on reduction of frequency and intensity of pain after both open and orthoscopic procedure on the shoulder among 70 post operative patients by using Visual Analogue Scale. The result indicated that Cryotherapy is an effective method for post operative pain control.

Keschan Schindl.K, et.al., (2014) had conduct a study to evaluate the effectiveness of continuous cryotherapy on pain reduction soon after Total Hip Arthroplasty (THA) among patients who had undergone THA for osteoarthritis. The pain scores measured on a visual analog scale. The results of this study support the potential benefit of a cold compressive device for pain reduction during the post-operative recovery of patients undergoing THA.

Okeke.Z, et.al (2014) conducted an experimental study in USA to evaluate the effectiveness of cryotherapy on delaying post-operative hemorrhage and reducing post-operative pain among 60 clients undergoing percutaneous renal surgery. The study concluded that cryotherapy decreased postoperative hemorrhage, length of hospitalization and postoperative pain.

Shin.Y.S. et.al.,(2013) conducted randomized controlled trial in Korea to evaluate the effect of cryotherapy on pain reduction among 97 craniotomy patients by using visual analogue scale. The result has showed that pain had significantly decreased after 3days of cryotherapy. The study had concluded that cryotherapy can control pain, cyclic edema and facial ecchymosis after craniotomy.

Chou.S.Y, Liu.H.E, (2013) conducted a Quasi experimental study in China to compare the effectiveness between moist and dry cryotherapy in reducing pain among 48 patients who have undergone orthogenetic surgery. The result showed that both moist and dry cryotherapy reduced post-operative discontent effectively. But moist cryo was more effective in reducing postoperative local heat, pain and swelling than the dry cryotherapy.

Arikan.O.K.M, Birol.A, et.al.,(2012) conducted a prospective randomized controlled study in Turkey to evaluate the effectiveness of cryotherapy in pain reduction among patients of minor form of recurrent aphthous stomatitis by using a six point scale. The result showed that there was less pain in aphthous stomatitis receiving cryotherapy. The study concluded that cryotherapy has beneficial analgesic effect in recurrent oral aphthous stomatitis.

Braun .K.P, Brookman – Amissah .S, (2012) conducted a prospective study in Germany to determine the effectiveness of whole body cryotherapy among 6 patients

with inflammatory rheumatic disease by using Visual Analogue Scale. The study has concluded that whole body cryotherapy is an effective concept in the treatment of inflammatory rheumatic diseases.

Algajly.A.A, George.K.P,(2011) conducted an experimental study in Manchester Metropolitan University to determine the impact of the application of cryotherapy on Nerve Conduction Velocity (NCV), Pain Threshold (PTH) and Pain Tolerance (PTO) among 23 adult male sports players by using pressure algometer. The results showed that NCV was significantly reduced and increased PTH and PTO. The study concluded that there is significant decrease in NCV after cryotherapy.

Yasumitsu Ohkoshi, et.al.,(2011) conducted a prospective and randomized study in Lousiana to evaluate the effectiveness of cryotherapy on intrarticular temperature and postoperative care among 21 patients undergone anterior cruciate ligament reconstruction surgery. The study revealed that the pain score and the number of time an analgesic to be administered were lower in experimental group than in control group.

Studies Related to Effectiveness of Cryotherapy On Level of Pain During ArterioVenous Fistula Vein Puncture

Vipinpatidar (2015) assessed the effectiveness of cryotherapy on pain during ArterioVenous fistula puncture among hemodialysis patients, in selected hospitals of Pune. A quantitative pre experimental research design was used. 60 samples were selected by non - probability purposive sampling and concluded that the cryotherapy is an effective tool in reducing level of pain during ArterioVenous fistula pain.

Alwin Issac and Praveen Namboothri (2015) assessed the effect of cryotherapy during ArterioVenous fistula puncture related pain among hemodialysis patients in SGPGIMS hospital of Lucknow. Convenience sample of 30 patients were selected. They found that the objective and subjective pain scores were significantly reduced (p=0.001).They concluded the need for adopting alternative therapies such as Cryotherapy for effective pain management in hospital settings.

Josel Lijya and Lobo Diana (2015) found the effect of cryotherapy on ArterioVenous fistula puncture relate pain among patients on hemodialysis at Mangalore. 50 samples were selected by purposive sampling technique and application of Cryotherapy in contralateral arm for 10 minutes as the intervention. The findings of the study concluded that Cryotherapy was effective in reducing subjective pain and objective behavioral responses scores of ArterioVenous puncture related pain.

Manal Fareed, et al. (2014) examined the effect of cutaneous stimulation its effect on pain relieving among hemodialysis patients at Egypt. A quasi experimental, 52 patients were randomly selected and cryotherapy was given in the contra lateral arm for 10 minutes. The study found that cutaneous stimulation is effective in reducing ArterioVenous fistula puncture objective and subjective pain scores among hemodialysis patients.

Shali G.S (2012) conducted a study on outcome of cryotherapy on ArterioVenous fistula puncture site pain among patient on hemodialysis in Vijaya health care centre .A experimental design was used a randomized control trial on 60 patient undergoing hemodialysis with ArterioVenous was done. It found to be significant (P=0.001) in reducing the ArterioVenous fistula puncture site pain. This

study highlights the need for adopting alternative therapies such as cryotherapy for effective pain management.

Asmaa Mahfouz Hussan,et al.(2012) found the impact of cryotherapy on pain intensity at puncture sites of ArterioVenous fistula among children undergoing hemodialysis. A quasi experimental design with 40 children was conducted for 6 months from two hemodialysis unit of Cairo University. The subjective pain was significantly reduced (P=0.05). They concluded that cryotherapy is effective in reducing subjective pain scores.

Sabitha.P.B,et al. (2008) assessed the effectiveness of cryotherapy on ArterioVenous fistula puncture pain in hemodialysis patients. 60 patients by using randomized control trial objective and subjective pain scoring was done for two consecutive days with cryotherapy for the experimental and without cryotherapy for control group. It was found significant reduction (P = 0.001) and concluded that cryotherapy is effective in reducing ArterioVenous fistula puncture pain of hemodialysis patients.

Ali Fakhr Movahedi, et al. (2006) determined the effect of local refrigeration prior to venipuncture on pain related responses in school age children a quasi-experimental study. The samples were 80 children selected by purposive sampling; the injection site was refrigerated for three minutes using an ice bag in the experimental group. The results showed use of local refrigeration prior to venipuncture can be considered an easy and effective intervention of reducing venipuncture related pain.

JS Park, et al. (2004) identified the effect of cutaneous stimulation on reduction of ArterioVenous fistula puncture pain on 45 hemodialysis patients. The

results showed that the subjective pain scores of AV fistula puncture pain in experimental group with cutaneous stimulation were lower compared to the control group. The reviewed literatures showed the promising effect of cryotherapy on ArterioVenous fistula puncture pain and this study proposes to evaluate the effect of cryotherapy on reduction of ArterioVenous fistula puncture pain.

CONCEPTUAL FRAMEWORK

MODIFIED KATHARINE KOLCABA'S THEORY OF COMFORT (1994)

Talbot bio stated (1995) that conceptual framework is a network of inter related concepts that provide a structure that organized and describe the phenomenon of interest. Research studies are based on the theoretical or conceptual frame work that facilitate visualizing the problem and place the variables in a logical concept.

The present study is aimed at evaluating the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis. The conceptual frame work of the present study is based on Modified Katharine Kolcaba's theory of comfort (1994).

Kolcaba (1994) had defined comfort as the immediate state of being strengthened through having the human needs for relief, ease and transcendence addressed in four contexts of experiences. The theory components are,

Health Care Needs

Kolcaba's defines health care needs identified are those by the patient/family in a particular practice setting.

This needs include physical, psychospiritual, social and environmental needs made apparent through monitoring verbal and non verbal reports, needs related to pathophysiological parameters, needs for education and support, and need for financial counseling and intervention.

In the present study health care need is reduction in ArterioVenous Fistula Vein Puncture related pain which is assessed through Standardized Numerical Pain Assessment Scale.

Comfort Measures

Comfort measures are define as nursing intervention designed to address specific comfort needs of recipients, including physiological, social, financial, psychological, spiritual, environmental and physical interventions. In this present study Cryotherapy application in the L14 is the point present on the medial midpoint of the first metacarpal between 2 to 4 mm of the web of skin between thumb and index finger of contra lateral arm is the nursing intervention designed to promote comfort.

Intervening Variables

Intervening variables are defined as interacting forces that influence recipient's perception of needs expressed by patient.

In the present study intervening variables are age, gender, educational status, duration of illness, and frequency of dialysis per month.

Comfort

Comfort is defined as the state experienced by recipient through comfort measures. It is the immediate and holistic experience being strengthened through having needs met for three types of comfort (relief, ease and transcendence). In this study patient experiences reduction in pain caused by ArterioVenous fistula vein

puncture by applying cryotherapy in the web between thumb and index finger of contra lateral arm.

Health Seeking Behavior

It represents the broad category of subsequent outcomes related to the pursuit of health as defined by the recipient in consultation with the nurse. In this present study cryotherapy was applied in order to reduce the ArterioVenous fistula vein puncture related pain among clients undergoing hemodialysis.

Institutional Integrity

The theory provides the following technical definition of institutional integrity. Corporations, communities, schools, hospitals, churches, reformatories and so on, that posses qualities or states of being complete, whole sound and upright, appealing honesty and sincere. The relationship between comfort and institutional integrity is recursive. In this hospital setting patient with ArterioVenous fistula vein puncture related pain is recursive.

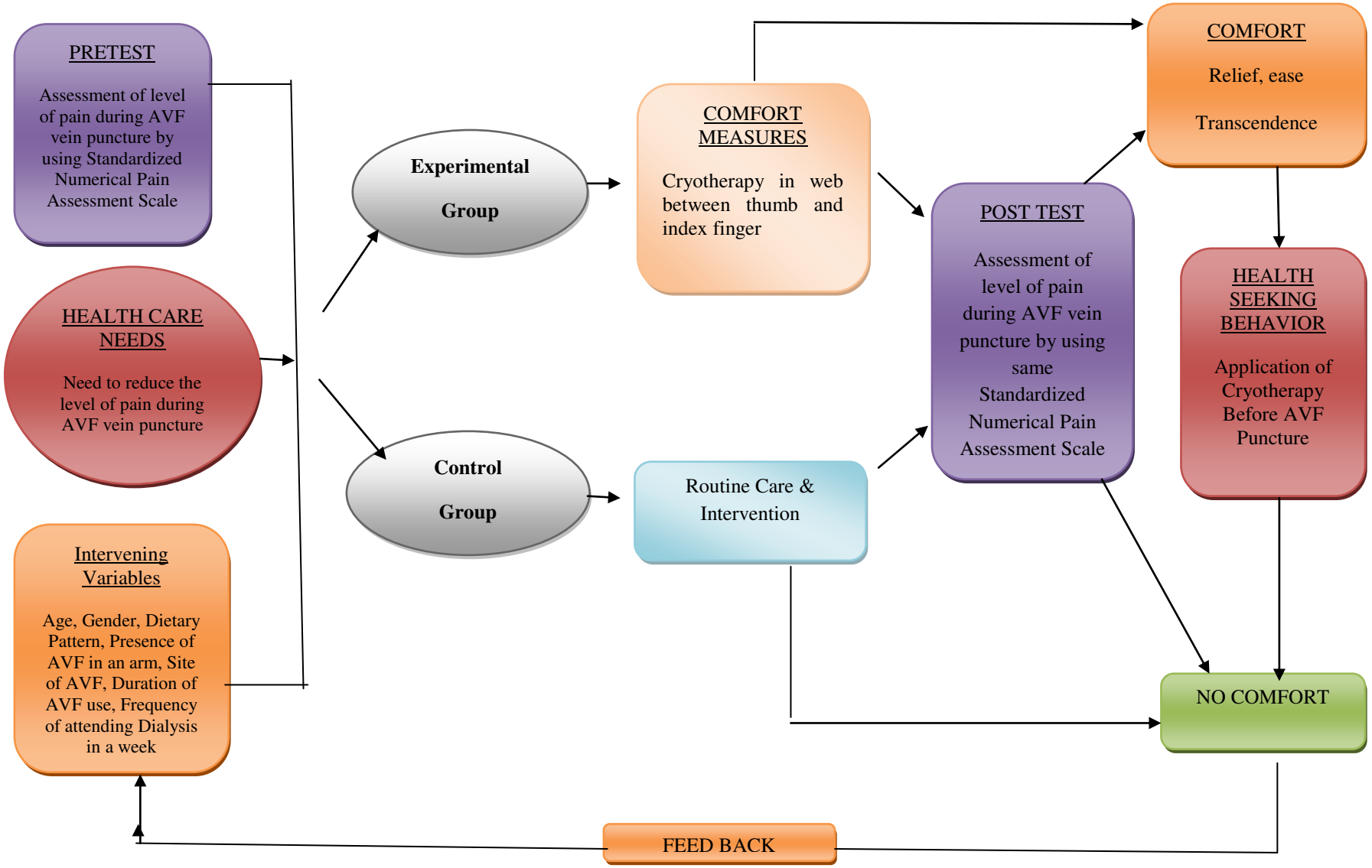


Figure 1 : Conceptual Frame Work Based On Modified Katharine Kolcaba's Theory of Comfort(1994)

CHAPTER - III

METHODOLOGY

Research methodology is one of the vital sections of the research, since the success of any research mostly depends upon the methodological issues that are followed in the execution of the research work. The role of the methodology consists of procedures and technique for conducting the study.

This chapter deals with the methodological approach adopted for the study. It include description of research approach research design, setting of the study, population, sample, criteria for sample selection, sampling technique, development of the tool, scoring procedure, pilot study, data collection procedure, plan for data analysis and protection of human rights.

Research Approach

Quantitative approach was used for analyzing the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

Research Design

Nancy Burn, Susan.K. Groove(2005), defined research design as a blue print for conducting the study that maximizes control over factor that could interfere with the validity of the findings. The research design guides the research in planning and implementing the study in a way that is most likely to achieve the intended goal.

According to Polit and Hungler (2004) “quasi experiment involve the manipulation of an independent variables that is, institution of an intervention. Quasi experiment however lacks either the randomization or control group features that characterize true experiments”.

Randomization was not adopted as it was not possible to have the entire listing of patients with ArterioVenous fistula vein puncture. Hence this design was selected.

Quasi experimental pretest posttest design with control group was adapted without randomization. Assessment was made before and after the intervention (Cryotherapy) with Standardized Numerical Pain Assessment Scale.

The diagrammatic representation of research design is as follows.

Group	Pre Test	Intervention	Post Test
Experimental	O 1	X	O 2
Control	O 3	#	O 4

O 2- O1 = Effectiveness of Cryotherapy.

Key

O1 - Assessment of level of pain during ArterioVenous Fistula Vein Puncture (Pre Test) in Experimental Group.

O2 - Assessment of level of pain during ArterioVenous Fistula Vein Puncture (Post Test) in Experimental Group.

X - Cryotherapy Intervention.

#	-	No Cryotherapy Intervention.
O3	-	Assessment of level of pain during ArterioVenous Fistula Vein Puncture (Pre Test) in Control Group.
O4	-	Assessment of level of pain during AterioVenous Fistula Vein Puncture (Post Test) in Control Group.

Variables

Dependent	-	ArterioVenous Fistula Puncture Related Pain.
Independent Variable	-	Cryotherapy on web between the thumb and index finger of the hand, not having AV Fistula (Contra Lateral Arm).
Extraneous Variable	-	Age, Gender, Dietary Pattern, Presence of AV Fistula an arm, Site of AV Fistula, Duration of AV Fistula use, Frequency of attending dialysis in a week and Size of cannula.

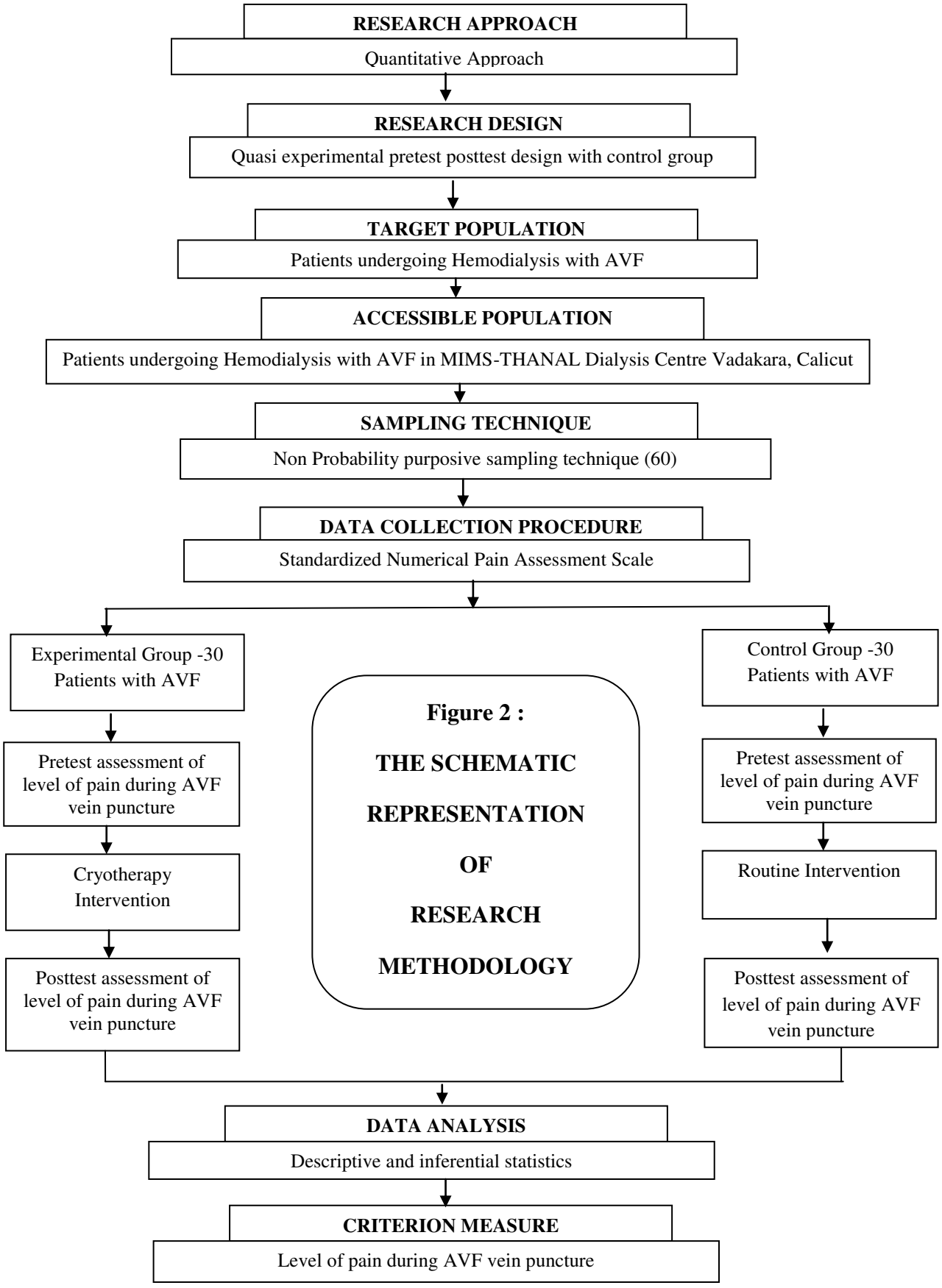


Figure 2 :

THE SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY

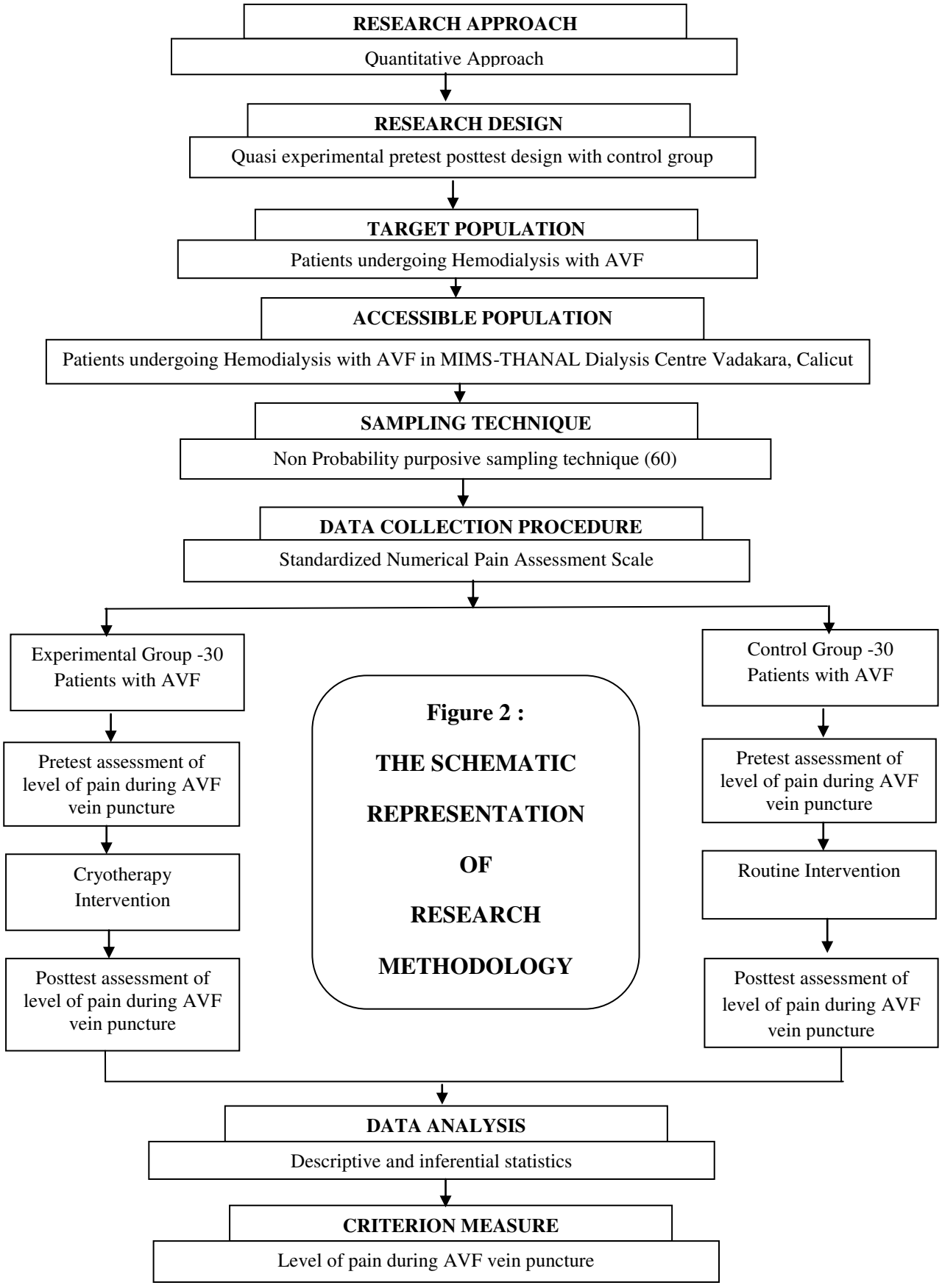


Figure 2 :

THE SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY

Setting of the Study

Polit and Hungler (2004) stated that physical location and conditions in which data collection takes place in study is the setting of the study. The study was conducted in MIMS – THANAL Dialysis Centre at Vadakara, Calicut. It is a 50 bedded & dialysis machine equipped Dialysis Centre. Here per day approximately 120 to 150 patients undergo hemodialysis every day expect Sunday's. For the partial fulfillment of the requirement of the Tamil Nadu Dr. MGR Medical University, this MIMS – THANAL Dialysis Centre has been selected for the study.

Population

According to Polit and Hungler (2004), "A population is the entire aggregation of cases in which a researcher is interested". The target population is the aggregation of cases about which the researcher would like to make generalizations. An accessible population is the section of the target population to which the researcher has reasonable access.

The target population for this study was patients undergoing hemodialysis with ArterioVenous Fistula. The accessible population for this study includes patients undergoing hemodialysis with ArterioVenous Fistula in MIMS – THANAL Dialysis Centre at Vadakara, Calicut.

Sample

Polit and Hungler, (2004) stated that sample consists of a subset of population selected to participate in a research study. A non-probability purposive sampling technique was adapted to select 60 samples for the present study. Among them 30 for experimental and 30 for control group were selected from the patients undergoing

hemodialysis with AterioVenous Fistula in MIMS – THANAL Dialysis Centre at Vadakara, Calicut.

Sample size

According to Denise F. Polit (2011) sample size is defined as, "the number of people who participate in a study".

Sample size was 60 patients undergoing hemodialysis at MIMS – THANAL Dialysis Centre, Vadakara, Calicut who fulfilled the inclusion criteria among them 30 were in the experimental group and 30 were in the control group.

Criteria for Sample Selection

Inclusion Criteria

- Patients diagnosed as Chronic Renal Failure.
- Patients undergoing hemodialysis through ArterioVenous Fistula.
- Patients more than 21 years of age.
- Both the genders.
- Patients who can understand English.
- Patients who are willing to participate in the study.

Exclusion Criteria

- Patients having ArterioVenous Graft, Venous Catheter.
- Patients who are all unconscious and terminally ill.
- Patients who are all not willing to participate.
- Patients having wound in the web between the thumb and the index finger of contra lateral arm.

Sampling Technique

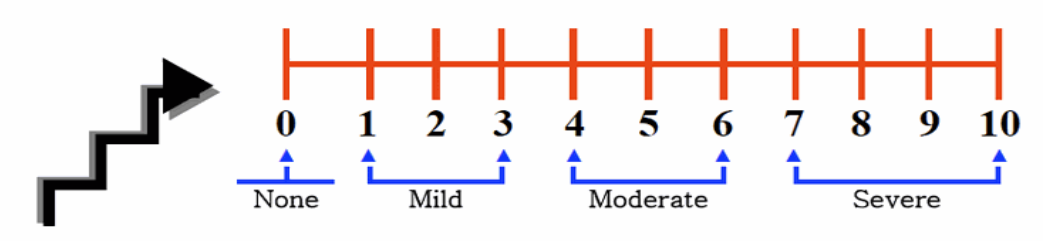
According to Polit and Hungler (2004) sampling technique is the process of selecting a portion of the population to represent the entire population. The samples were selected for the study by adapting non probability purposive sampling technique which means selection of the most readily available persons as participants in a study. Samples were selected based on inclusion and exclusion criteria.

Description of the Tool

The Standardized Numerical Pain Assessment Scale was used to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture it consisted of 2 parts.

Part I: Consists of demographic variables of patients undergoing hemodialysis with ArterioVenous Fistula (Age, Gender, Dietary Pattern, Presence of AV Fistula an arm, Site of AV Fistula, Duration of AV Fistula use, Frequency of attending dialysis in a week and Size of cannula used).

Part II: Consists of Standardized Numerical Pain Assessment Scale in range of 0-10, in which '0' indicates no pain, '1-3' indicates mid pain, '4-6' indicates moderate pain, '7-10' indicates severe pain.



Scoring Procedure

Each statement is scored as follows,

Score	Level of Pain
0	No pain
1 – 3	Mild pain
4 – 6	Moderate pain
7 – 10	Severe pain

Cryotherapy Technique Intervention

Cryotherapy is the cold application. Glove is filled with ice cubes, and this glove is applied over L14 is the point present on the medial midpoint of the first metacarpal between 2 to 4 mm of the web between the thumb and index finger of the hand not having the ArterioVenous Fistula (contra lateral arm). The ice application was started 10 minutes before the vein puncture and continued throughout the puncturing procedure.

Validity

According to Nancy Burns (1999) validity is the determination of the extent to which an instrument actually reflects the abstract construct being examined. Judgment is based on prior research in the field and on the opinion of the expert.

The content validity was done by experts including four nursing experts in Medical Surgical Nursing, one medical experts in the field of Nephrology. All suggestions were considered and appropriate changes were made.

Pilot Study

According Polit and Beck (2004) denote that pilot study is a small scale version or trial run done in preparation for the main study.

Pilot study was conduct in Karpagam Hospital, Coimbatore to assess the feasibility of the study and to decide the statistical analysis. The permission for study was obtained from the medical officer of the hospital. 6 patients undergoing hemodialysis via ArterioVenous Fistula were selected for pilot study by using non probability purposive sampling technique. The pilot study finding was found to be feasible and statistical tests were appropriate for the main study.

Data Collection Procedure

A prior permission was obtained from the medical officer of MIMS – THANAL Dialysis Centre, Vadakara, Calicut. The study was conducted for period of six weeks. Since it was not possible to have the entire samples on one day, daily around 4 to 5 samples were selected based on the criteria for sample selection. The patients were assigned alternatively to the experimental group and control group. The patients were explained about the purpose of the study and written consent was obtained and assured of confidentiality of the data collected.

On the First day of dialysis sitting the demographic variables and the Standardized Numerical Pain Assessment Scale was administered through structured interview schedule for pretest assessment of level of pain during ArterioVenous Fistula vein puncture among hemodialysis patients in experimental and control group. It took ten minutes for each sample. On the Second day of dialysis sitting, the cryotherapy is a cold application done with ice cubes wrapped in a glove on the web

between the thumb and index finger of the hand not having ArterioVenous Fistula (Contra Lateral Arm) started 10 minutes before the puncturing procedure and continued throughout the procedure to the experimental group alone and routine procedure to control group in posttest assessment of level of pain during ArterioVenous Fistula vein puncture among patients undergoing hemodialysis by using the same Standardized Numerical Pain Assessment Scale was done in both the groups. An evaluation was carried out soon after the procedure for the experimental group and control group.

Plan for Data Analysis

The demographic variables were analyzed by using descriptive measures (frequency and percentage). The level of pain was analyzed by using descriptive statistics (mean, standard deviation). The effectiveness of Cryotherapy was analyzed by using paired‘t’ test and independent‘t’ test. Association between the levels of pain during ArterioVenous Fistula Vein Puncture among patients undergoing hemodialysis with their selected demographic variables was assessed by chi-square test.

Protection of Human Rights

The study was conducted after the approval of research committee in the college and the hospital. The nature and purposes of this study was explained to the patients who participate in this study. The written consent was obtained from the study participants to gain full cooperation. Assurance was given to the study samples that the anonymity and confidentiality was maintained throughout the study. The Cryotherapy was suggested and taught to the control group after the posttest to overcome the ethical issues.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with analysis and interpretation of the data collected from patient undergoing hemodialysis, regarding Effectiveness of Cryotherapy on Level of Pain during ArterioVenous Fistula Vein Puncture. The findings based on the descriptive and inferential statistical analysis were presented under the following headings:

Section I : Data On Demographic Variables Of Patients With ArterioVenous Fistula Vein Puncture Related Pain.

Section II : Data On Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis.

Section III : Data On Effectiveness Of Cryotherapy On Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis.

Section IV : Data On Association Between The Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis With Their Selected Demographic Variables.

SECTION – I

Data On Demographic Variables Of Patients With ArterioVenous Fistula Vein Puncture Related Pain.

Table 1

Frequency And Percentage Distribution Of Demographic Variables Of Patient On Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In Experimental And Control Group.

(n=60)

S. No.	Demographic Variables	Experimental Group		Control Group	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1.	Age in Years				
	a) 21 – 40	9	30%	12	40%
	b) 41 – 60	12	40%	12	40%
	c) 61 – 80	9	30%	6	20%
2.	Gender				
	a) Male	15	50%	18	60%
	b) Female	15	50%	12	40%
3.	Dietary Pattern				
	a) Vegetarian	6	20%	3	10%
	b) Mixed diet	24	80%	27	90%
4.	Presence of AV Fistula in an arm				
	a) Right arm	3	10%	6	20%
	b) Left arm	27	90%	24	80%

5.	Site of AV Fistula				
	a) Radio-cephalic-AVF	15	50%	12	40%
	b) Brachio-cephalic-AVF	3	10%	3	10%
	c) Brachio-basilic-AVF	12	40%	15	50%
6.	Duration of Av Fistula use				
	a) 1 – 6 months	9	30%	6	20%
	b) 7 – 12 months	9	30%	12	40%
	c) 13 – 18 months	9	30%	9	30%
	d) 19 – 24 months	3	10%	3	10%
7.	Frequency of attending Dialysis in a Week				
	a) Twice	9	30%	6	20%
	b) Thrice	21	70%	24	80%
8.	Size of AVF cannula used				
	a) 16G	6	20%	3	10%
	b) 17G	24	80%	27	90%

Table 1 shows that out of 30 subjects in experimental group 9(30%) belongs to the age group between 21-40 years, 12(40%) belongs to the age group between 41-60 years, 9(30%) belongs to the age group between 61-80 years. Out of 30 subjects in control group 12(40%) belongs to the age group between 21-40 years, 12(40%) belongs to the age group between 41-60 years, 6(20%) belongs to the age group between 61-80 years.

Regarding gender in experimental group, 15(50%) were males and 15(50%) were females. In control group, majority 18(60%) were males and 12(40%) were females.

Regarding dietary pattern, in experimental group 6(20%) were vegetarian, majority 24(80%) was mixed diet. In control group 3(10%) were vegetarian, majority 27(90%) were mixed diet.

Regarding presence of AV Fistula in an arm, in experimental group 3(10%) were having at right arm, majority 27(90%) were having at left arm. In control group 6(20%) were having at right arm, majority 24(80%) were having at left arm.

Regarding site of AV Fistula, in experimental group 15(50%) were having at Radio-cephalic-AVF, 3(10%) were having at Brachio-cephalic-AVF, 12(40%) were having at Brachio-basilic-AVF. In control group 12(40%) were having at Radio-cephalic-AVF, 3(10%) were having at Brachio-cephalic-AVF, 15(50%) were having at Brachio-basilic-AVF.

Regarding duration of AV Fistula use, in experimental group 9(30%) were up to 1-6 months, 9(30%) were up to 7-12 months, 9(30%) were up to 13-18 months, 3(10%) was up to 19-24 months. In control group 6(20%) were up to 1-6 months, 12(40%) were up to 7-12 months, 9(30%) were up to 13-18 months, 3(10%) were up to 19-24 months.

Regarding frequency of attending dialysis in a week, in experimental group 9(30%) were attending dialysis twice a week, 21(70%) was attending dialysis thrice a week. In control group 6(20%) were attending dialysis twice a week, 24(80%) were attending dialysis thrice a week.

Regarding size of AVF cannula used, in experimental group 6(20%) were using 16G AVF cannula, 24(80%) were using 17G AVF cannula. In control group 3(10%) were using 16G AVF cannula, 27(90%) were using 17G AVF cannula.

Table 1 reveals that with regard to the experimental group demographic variables of majority between 41-60 years of age, were males and females are equally in population, majority patients dietary pattern was mixed diet, most of the patients had AV Fistula in left arm, more patients had AV Fistula in Radio-cephalic-AVF site, most of the patients using AV Fistula between '1-6, 7-12, 13-18' months, majority patients attending dialysis thrice in a week frequently, most of the patients using 17G size of AVF cannula. And in the control group demographic variables of majority between 21-40 & 41-60 years of age, males were the majority in population, majority patients dietary pattern was mixed diet, most of the patients had AV Fistula in left arm, more patients had AV Fistula in Brachio-basilic-AVF site, most of the patients using AV Fistula between 7-12 months, majority patients attending dialysis thrice in a week frequently, most of the patients using 17G size of AVF cannula.

SECTION: II

Data on Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis.

Table 2.1

Frequency And Percentage Distribution Of Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In Experimental Group

(n=30)

S.No	Variables	Pre Test		Post Test	
		n	%	n	%
1.	Level of Pain				
	a) No Pain	0	0	0	0
	b) Mild Pain	0	0	22	73.3
	c) Moderate Pain	11	36.6	8	26.6
	d) Severe Pain	19	63.3	0	0

Table 2.1 reveals that in experimental group, in pretest 11 (36.6%) reported moderate pain and 19 (63.3%) reported severe pain. After intervention of Cryotherapy in posttest 22 (73.3%) reported mild pain and 8 (26.6%) reported moderate pain.

It was inferred that, majority of the patients in experimental group having severe pain in pretest. After intervention of Cryotherapy given the most of the patients feels mild pain at posttest in experimental group.

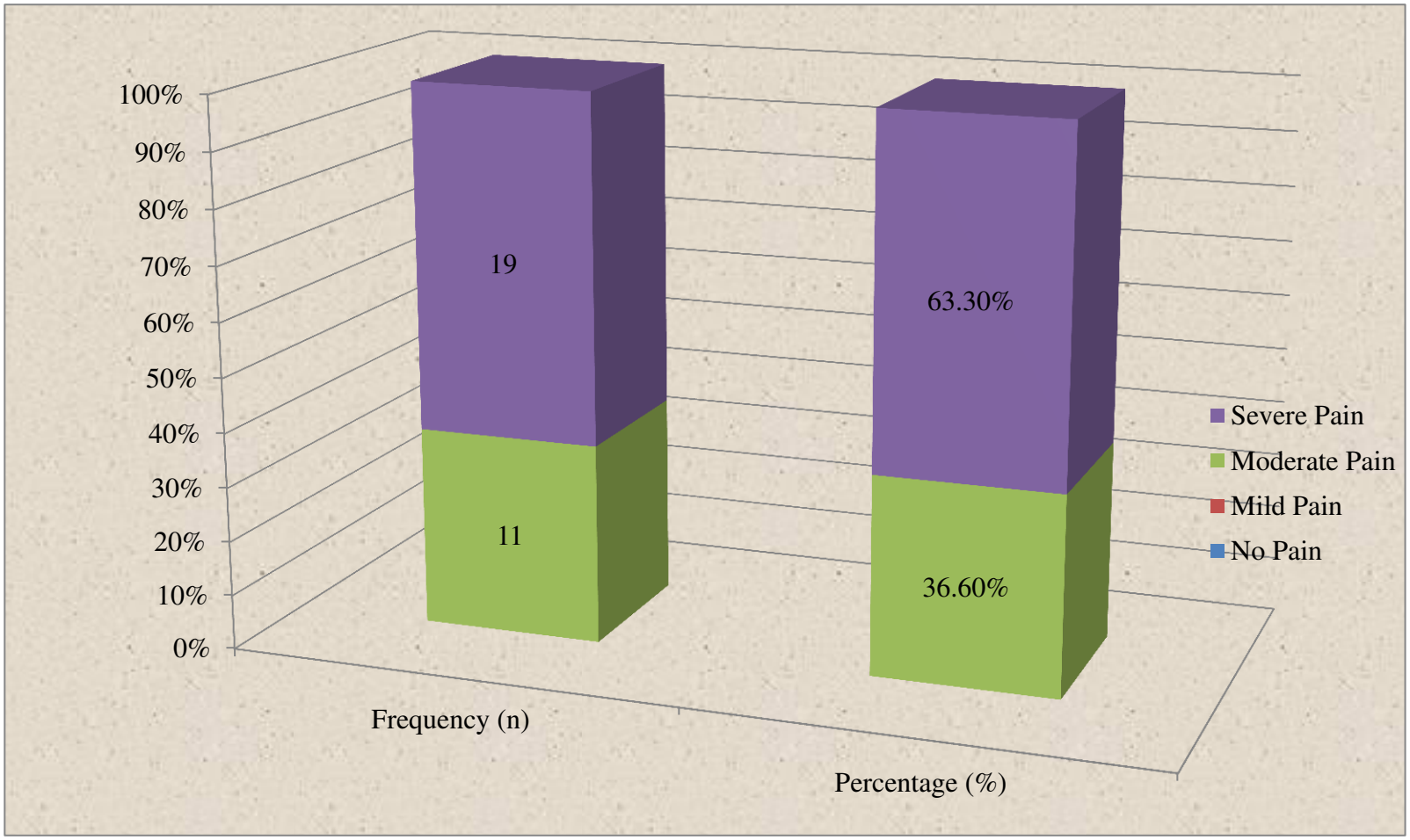


Figure 3 : Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis in Experimental Group (Pre-Test)

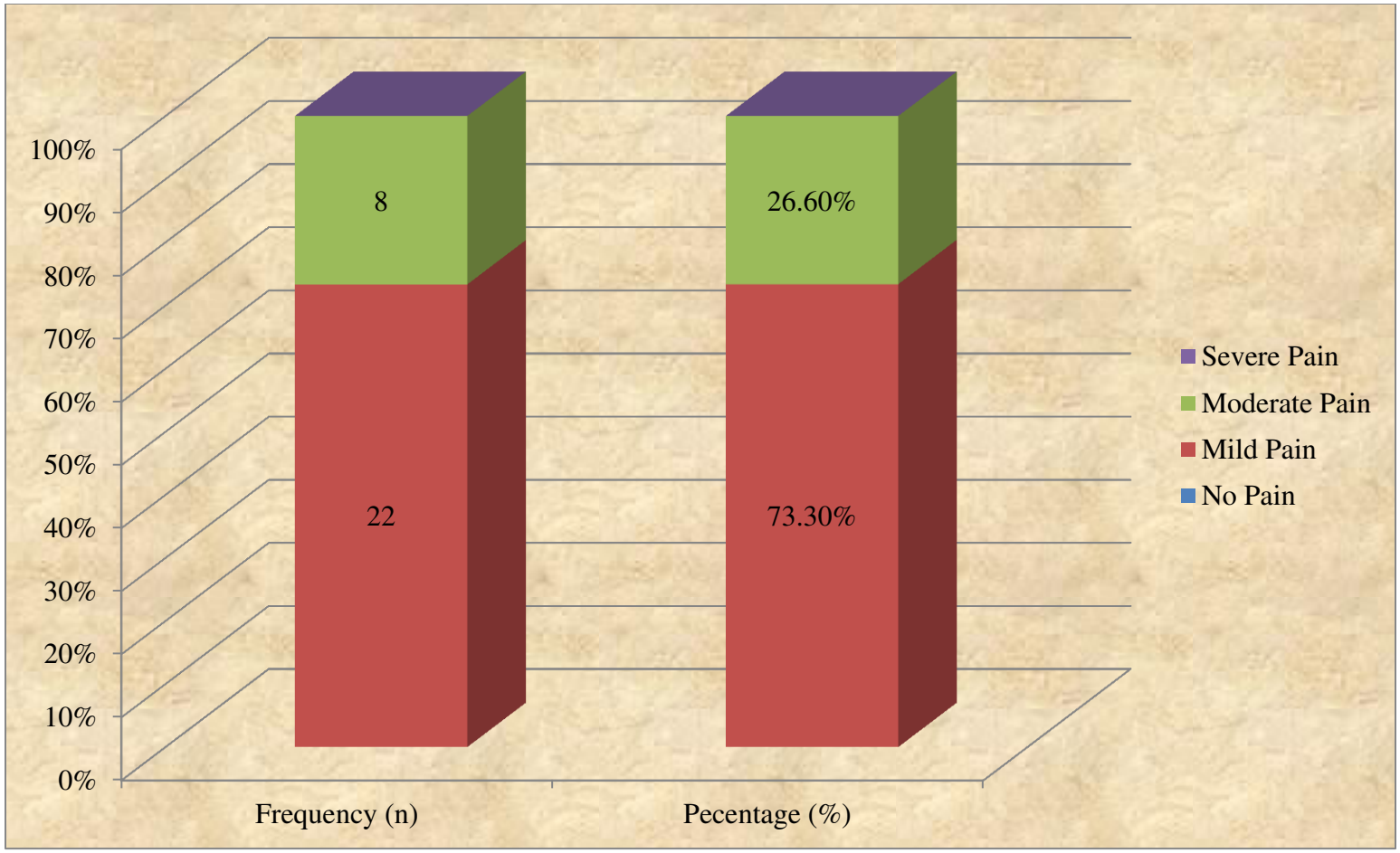


Figure 4 : Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis in Experimental Group (Post-Test)

Table 2.2

Frequency And Percentage Distribution Of Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In Control Group

(n=30)

S.No	Variables	Pre Test		Post Test	
		N	%	n	%
1.	Level of Pain				
	a) No Pain	0	0	0	0
	b) Mild Pain	0	0	0	0
	c) Moderate Pain	5	16.6	14	46.6
	d) Severe Pain	25	83.3	16	53.3

Table 2.2 reveals that in control group, in pretest 5 (16.6%) reported moderate pain and 25 (83.3%) reported severe pain. During posttest 14 (46.6%) reported moderate pain and 16 (53.3%) reported severe pain.

It was inferred that, majority of the patients in control group having severe pain in pretest. And most of the patients feel severe pain at posttest in control group without any intervention.

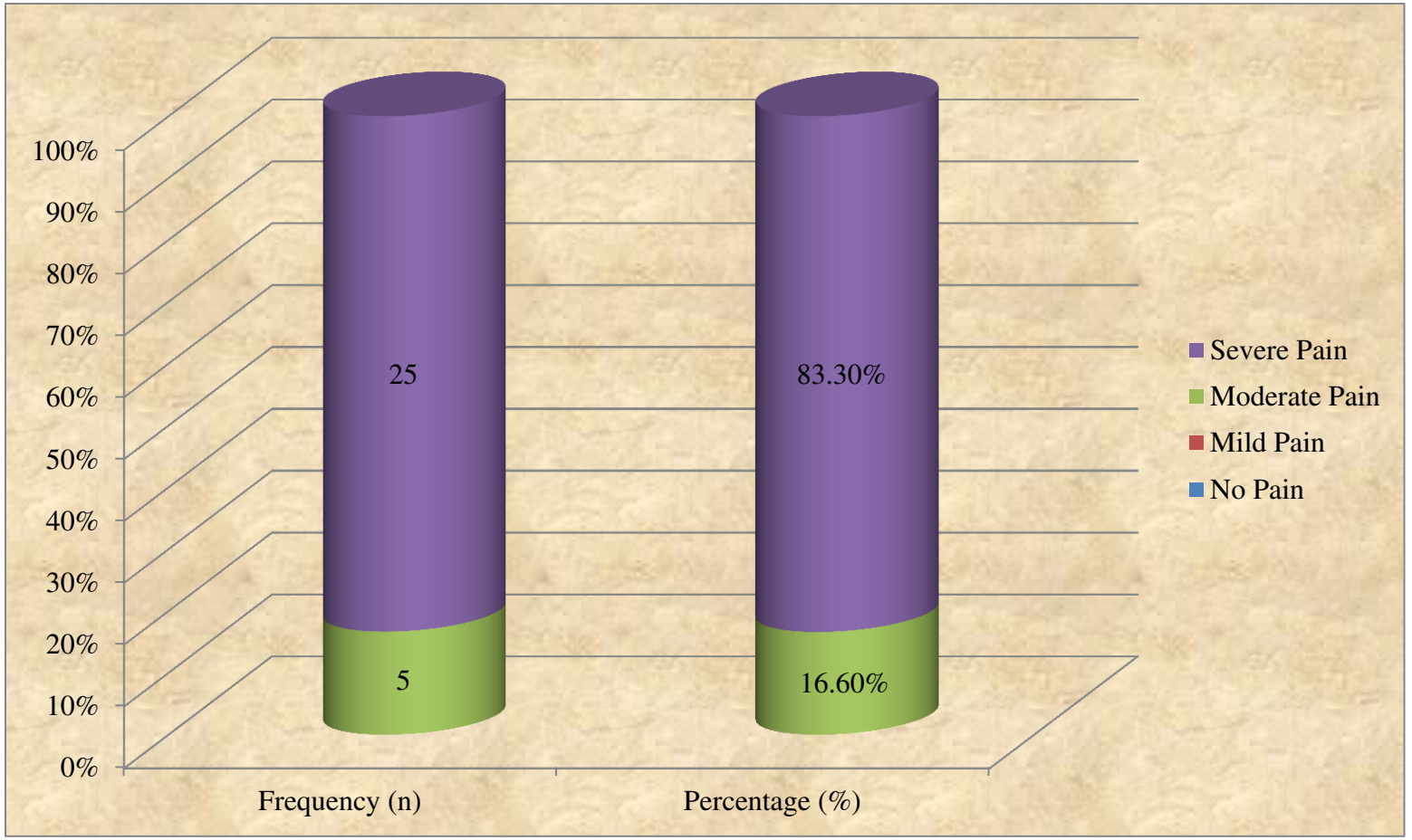


Figure 5 : Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis in Control Group (Pre-Test)

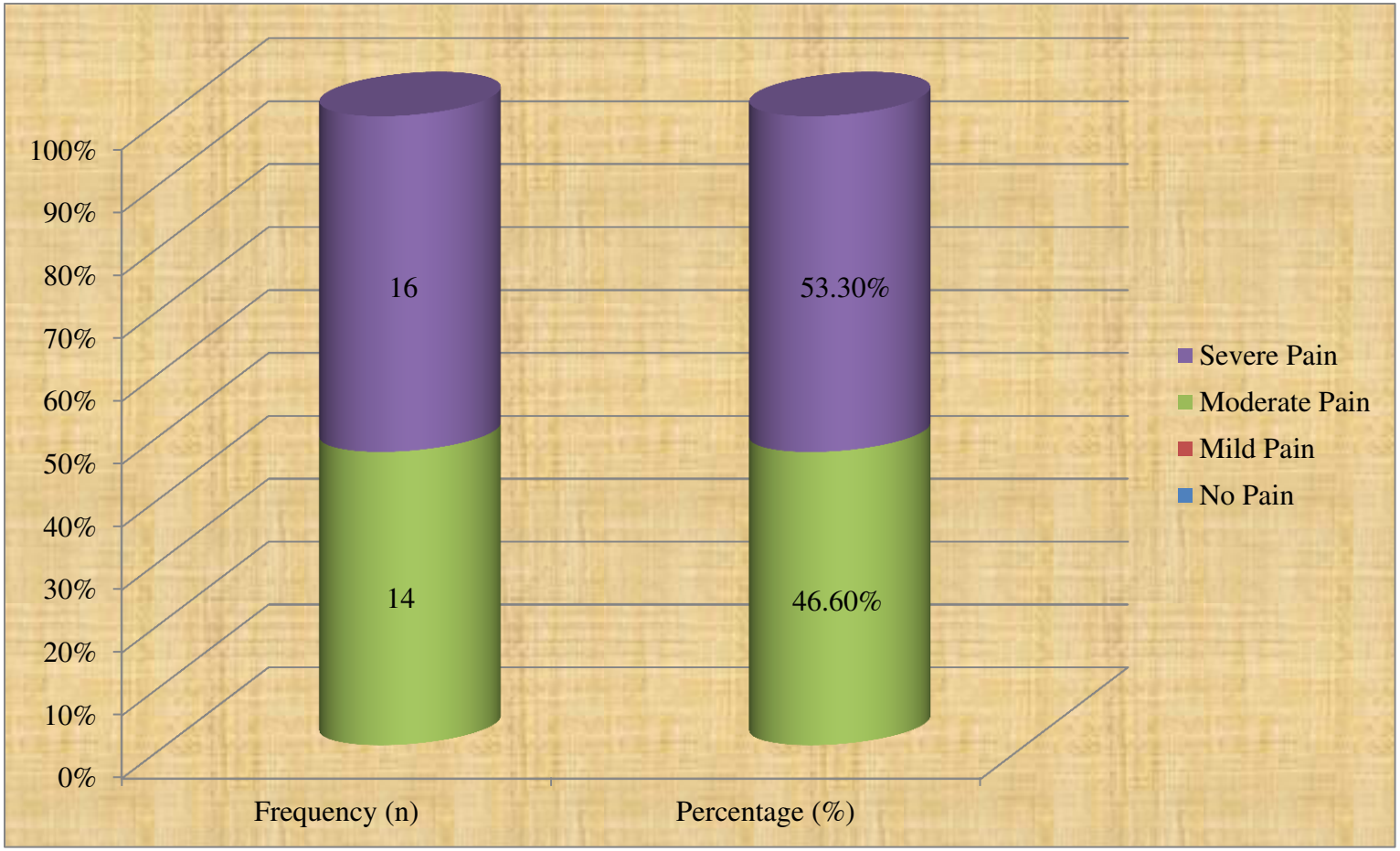


Figure 6 : Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis in Control Group (Post-Test)

SECTION – III

Data On Effectiveness Of Cryotherapy On Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis.

Table 3

Mean, Standard Deviation And 't' Value Of Post Test Score Of Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In Experimental Group And Control Group.

(n=60)

S. No.	Group	N	Mean	SD	't' value
1.	Experimental Group: Post test	30	2.9	0.7	20.52***
2.	Control Group: Post test	30	6.7	0.7	

***significant at p<0.05 level

Table 3 reveals that posttest mean score of level of pain during ArterioVenous fistula vein puncture in experimental group was 2.9 which is lower than the posttest mean score of 6.7 in control group. The standard deviation of experimental group was 0.7 and the standard deviation of control group was 0.7. The obtained 't' value was

20.52 which is highly significant at $p<0.05$ level. The 't' value 20.52 is greater than table value (1.671). Hence the stated hypothesis (H_1) was accepted.

H_1: There is a significant difference in the post-test level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in experimental group & control group.

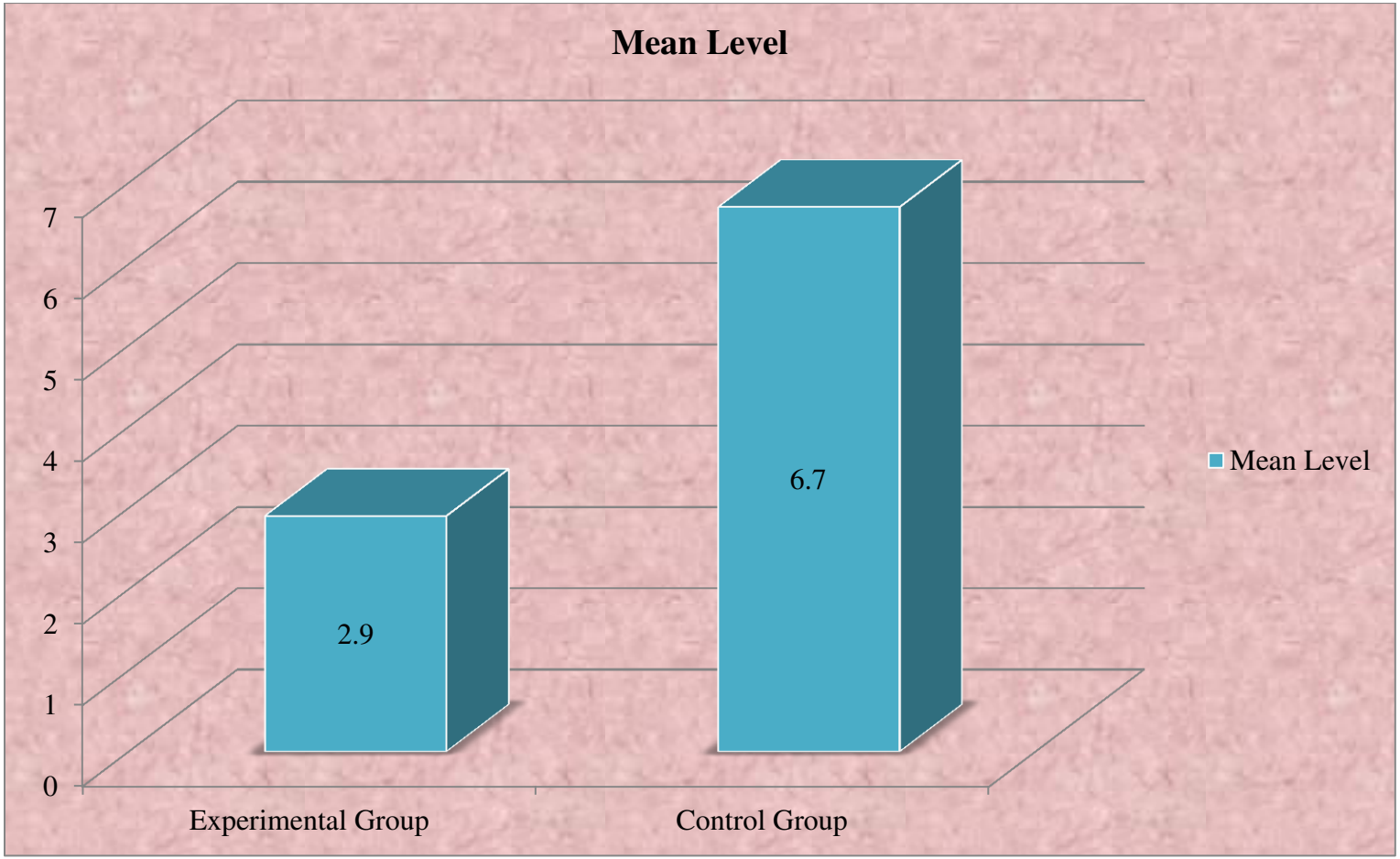


Figure 7 : Post-Test Mean Value of Level of Pain During ArterioVenous Fistula Vein Puncture in Experimental and Control Group

SECTION – IV

Data On Association Between The Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis With Their Selected Demographic Variables.

Table 4

Frequency, Percentage Distribution And Chi-Square Value On Level Of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis With Their Selected Demographic Variables.

(n=60)

S. No.	Demographic Variables	Mild Pain		Moderate Pain		Severe Pain		Chi-square Value
		(n)	(%)	(n)	(%)	(n)	(%)	
1.	Age in Years							
	a) 21 – 40	0	0	10	16.6	11	18.3	8*
	b) 41 – 60	0	0	5	8.3	19	31.6	df=2
	c) 61 – 80	0	0	1	1.6	14	23.3	
2.	Gender							
	a) Male	0	0	14	23.3	19	31.6	9.1*
	b) Female	0	0	2	3.3	25	41.6	df=1
3.	Dietary Pattern							
	a) Vegetarian	0	0	2	3.3	7	11.6	0.094^{NS}
	b) Mixed diet	0	0	14	23.3	37	61.6	df=1

4.	Presence of AV Fistula in an arm							
	a) Right arm	0	0	7	11.6	2	3.3	14*
	b) Left arm	0	0	9	15	42	70	df=1
5.	Site of AV Fistula							
	a) Radio-cephalic-AVF	0	0	11	18.3	16	26.6	9.3*
	b) Brachio-cephalic-AVF	0	0	3	5	3	5	df=2
	c) Brachio-basilic-AVF	0	0	2	3.3	25	41.6	
6.	Duration of Av Fistula use							
	a) 1 – 6 months	0	0	1	1.6	14	23.3	
	b) 7 – 12 months	0	0	2	3.3	19	31.6	15.41*
	c) 13 – 18 months	0	0	10	16.6	8	13.3	df=3
	d) 19 – 24 months	0	0	3	5	3	5	
7.	Frequency of attending Dialysis in a Week							
	a) Twice	0	0	6	10	9	15	1.5^{NS}
	b) Thrice	0	0	10	16.6	35	58.3	df=1
8.	Size of cannula used							
	a) 16G	0	0	7	11.6	2	3.3	14*
	b) 17G	0	0	9	15	42	70	df=1

*-significant at $p<0.05$ Level, NS – Not singnificant

Table 4 envisages the substantive summary of chi-square analysis, which was used to find out the association between the pain and demographic variables of the groups.

With regard to age, among 21-40 years 10(16.6%) had moderate pain and 11(18.3%) had severe pain. Among 41-60 years 5(8.3%) had moderate pain,

19(31.6%) had severe pain. Among 61-80 years 1(1.6%) had moderate pain, 14(23.3%) had severe pain. The obtained chi-square value was 8 which are significant at $p<0.05$ levels and thus the stated hypothesis (H_2) is accepted. So it is inferred that there is significant association between age and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to gender, among males 14(23.3%) had moderate pain, 19(31.6%) had severe pain. Among females 2(3.3%) had moderate pain, 25(41.6%) had severe pain. The obtained chi-square value was 9.1 which are significant at $p<0.05$ level and thus the stated hypothesis (H_2) is accepted. So inferred that there is significant association between gender and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to dietary pattern, among vegetarian 2(3.3%) had moderate pain, 7(11.6%) had severe pain. Among mixed diet 14(23.3%) had moderate pain, 37(61.6%) had severe pain. The obtained chi-square value was 0.094 which is not significant. So it is inferred that there is no significant association between the dietary pattern and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to presence of AV fistula in an arm, among right arm 7(11.6%) had moderate pain, 2(3.3%) had severe pain. Among left arm 9(15%) had moderate pain, 42(70%) had severe pain. The obtained chi-square value was 14 which are significant at $p<0.05$ levels and thus the stated hypothesis (H_2) is accepted. So inferred that there is significant association between presence of AV Fistula in an arm and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to site of AV Fistula, among Radio-cephalic-AVF 11(18.3%) had moderate pain, 16(26.6%) had severe pain. Among Brachio-cephalic-AVF 3(5%) had moderate pain, 3(5%) had severe pain. Among Brachio-basilic-AVF 2(3.3%) had moderate pain, 25(41.6%) had severe pain. The obtained chi-square value was 9.3 which are significant at $p<0.05$ levels and thus the stated hypothesis (H_2) is accepted. So inferred that there is significant association between site of AV Fistula and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to duration of AV Fistula use, among 1-6 months 1(1.6%) had moderate pain, 14(23.3%) had severe pain. Among 7-12 months 2(3.3%) had moderate pain, 19(31.6%) had severe pain. Among 13-18 months 10(16.6%) had moderate pain, 8(13.3%) had severe pain. Among 19-24 months 3(5%) had moderate pain, 3(5%) had severe pain. The obtained chi-square value was 15.41 which are significant at $p<0.05$ levels and thus the stated hypothesis (H_2) is accepted. So inferred that there is significant association between duration of AV Fistula use and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

With regard to frequency of attending dialysis in a week, among twice 6(10%) had moderate pain, 9(15%) had severe pain. Among thrice 10(16.6%) had moderate pain, 35(58.3%) had severe pain. The obtained chi-square value was 1.5 which is not significant. So it is inferred that there is no significant association between the frequency of attending dialysis in a week and level of pain during ArterioVenous Fistula Vein puncture among patients undergoing hemodialysis.

With regard to size of cannula used, among 16G 7(11.6%) had moderate pain, 2(3.3%) had severe pain. Among 17G 9(15%) had moderate pain, 42(70%) had severe pain. The obtained chi-square value was 14 which are significant at $p<0.05$ levels and thus the stated hypothesis (H_2) is accepted. So inferred that there is significant association between size of cannula used and level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

Table 4 reveals that association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in experimental & control group are "age, gender, presence of AV Fistula in an arm, site of AV Fistula, duration of AV fistula use, size of cannula used" were found as significant. Hence the stated hypothesis (H_2) "There is significant association between level of pain during ArterioVenous Fistula Vein Puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group" was accepted.

Regarding dietary pattern and frequency of attending dialysis in a week are the demographic variables were not significant association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

CHAPTER V

DISCUSSION

The basic aim of the current study was to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis. The study was conducted by using Quasi-experimental pre-test and post-test control group design. MIMS – THANAL Dialysis Centre, Vadakara, Calicut was selected for conducting the study. The sample size was 60, among which 30 in experimental group and 30 in control group were selected.

By using structured interview schedule Standardized Numerical Pain Assessment Scale was administered to assess the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

The responses were analyzed through descriptive statistics (mean, standard deviation, frequency, percentage) and inferential statistics ('t' test and Chi-square). Discussion on the findings was arranged based on the objective of the study.

The objective of the present study was to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula puncture among patients undergoing hemodialysis.

Accordingly First objective of the study was to assess the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group and Control Group. The study findings revealed that among experimental group, in pre-test 11(36.6%) had moderate pain, 19(63.3%) had severe pain and in post-test 22(73.3%) had mild pain, 8(26.6%) had moderate pain (Table

2.1). And among control group, in pre-test 5(16.6%) had moderate pain, 25(83.3%) had severe pain and in post-test 14(46.6%) had moderate pain and 16(53.3%) had severe pain (Table 2.2).

The findings of the study was supported by S.Benin Sundar (2017) who conducted a study related to "Assess The Level Of Pain During ArterioVenous Fistula Puncture Site Among Patients On Hemodialysis", the findings are in pretest, In experimental group, 14(46.67%) had moderate, 10(33.33%) had severe and 6(20%) had mild level of pain. In control group 15(50%) had moderate, 10(33.33%) had severe and 5(16.67%) had mild level of pain. In posttest, In experimental group 14(46.67%) had mild, 13(43.33%) had moderate and only 3(10%) had severe level of pain. In control group, 16(53.33%) had moderate, 9(30%) had severe and 5(16.67%) had mild level of pain.

Accordingly Second objective of the study was to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in Experimental Group. The study findings reveals that posttest mean score of level of pain during ArterioVenous fistula vein puncture in experimental group was 2.9 which is lower than the posttest mean score of 6.7 in control group. The standard deviation of experimental group was 0.7 and the standard deviation of control group was 0.7. The obtained 't' value was 20.52 which is highly significant at $p<0.05$ level. The 't' value 20.52 is greater than table value (1.671). Hence the stated hypothesis (H_1) was accepted "There is a significant difference in the post-test level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in experimental group & control group". (Table 3)

The study was supported by Dipali Umesh Dumbre (2016) who conducted an experimental study related to assess the effectiveness of cryotherapy on pain due to ArterioVenous Fistula Puncture. 60 patients undergoing hemodialysis by using ArterioVenous Fistula were taken as sample. Among them 30 were in experimental group and control group. The findings are in experimental group was 2.1 which is lower than the posttest mean score of 7.1 in control group. The standard deviation of experimental group was 1.7 and the standard deviation of control group was 2.7. The obtained 't' value was 15.40 which is highly significant at $p<0.05$ level. The 't' value 15.40 is greater than table value (1.671).

Accordingly Third objective of the study was to determine the association between level of pain during ArterioVenous fistula vein Puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group. The study results revealed that association between level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables in experimental & control group are "age, gender, presence of AV Fistula in an arm, site of AV Fistula, duration of AV fistula use, size of cannula used" were found as significant. Hence the stated hypothesis (H_2) accepted "There is significant association between level of pain during ArterioVenous Fistula Vein Puncture among patients undergoing hemodialysis and selected demographic variables in Experimental Group and Control Group". Regarding dietary pattern and frequency of attending dialysis in a week are the demographic variables were not significant association between level of pain during ArterioVenous Fistula Vein Puncture among patients undergoing hemodialysis. (Table 4)

The findings of the study was supported by Vipin Patidar (2015) who conducted a study related to "Assess The Effectiveness Of Cryotherapy On Level Of Pain During ArterioVenous Fistula Puncture Site Among Patients On Hemodialysis", The study results revealed that there was association between the level of pain during ArterioVenous fistula vein puncture and selected demographic variables(age in year, gender, presence of AV Fistula in an arm, site of AV Fistula, personal habit).

CHAPTER VI

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter deals with summary, conclusion, limitations and recommendations of the study. Further it includes implications for nursing practice, nursing education, nursing administration and nursing research.

Summary of the study

The present study was to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis in a selected hospital at Kerala.

Objective of the study was to evaluate the effectiveness of cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

A quasi-experimental pre-test and post-test with control group design was chosen for this study without randomization. The samples were selected for this study by adopting purposive sampling technique. The sample selected for the present study was 60 among which 30 for experimental and 30 for control group. The data was collected by structured interview questionnaire, and Standardized Numerical Pain Assessment Scale was administered to assess the level of ArterioVenous fistula vein puncture related pain among patients undergoing hemodialysis.

The tool was used to collect the data, which consisted of two parts. Part I consisted of Demographic variables. Part II consisted of Standardized Numerical Pain Assessment Scale to assess the level of pain.

The contents of the questionnaire were checked and evaluate by five experts. The experts were one doctor specializes in Nephrology and General medicine, four nursing experts nursing experts specialized in Medical Surgical Nursing. Data was collected for 6 weeks in MIMS – THANAL Dialysis Centre, Vadakara, Calicut.

The data collected were analyzed through descriptive statistics (frequency and percentage) and inferential statistics ('t' test and Chi-square) to test the hypothesis.

Major Findings of the Study

Major study findings include

- Among patients with pain during ArterioVenous Fistula puncture, most of them were between 41-60 years, most of them males, majority belongs to mixed diet, most of them having AV fistula in left arm, majority of them using AV fistula between 7-12 months, most of them attending dialysis thrice a week frequently, majority person using 17G size for AV fistula cannulation.
- Regarding to the level of pain during ArterioVenous fistula vein puncture in experimental and control group most of them reported moderate and severe pain on day one in both group, on second day most of them reported mild and moderate pain in experimental group and there were no measurable difference in control group.
- With regard to effectiveness of cryotherapy on level of pain during ArterioVenous fistula puncture. The obtained 't' value for in control group was 2.4 which is not significant. And in experimental group the 't' value was 25.65 that was highly significant at $p<0.05$ level.

- With regard to association between the level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and selected demographic variables (age in year, gender, presence of AV Fistula in an arm, site of AV Fistula, Duration of AV Fistula use, size of cannula used).

Conclusion

The main conclusion from this present study is that most of the hemodialysis patients with pain during ArterioVenous fistula vein puncture in experimental group had moderated and severe pain in pre-test and mild and moderate pain in post-test. This shows the imperative need to understand the purpose of cryotherapy technique regarding reduction of level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis and it will improve the quality of life which includes the stability in physiological, psychological vocational and life style aspects.

Implication of the Study

According to Tolsma, (1995) the section of the research report that focuses on nursing education, nursing administration and nursing research.

Nursing Practice

The findings of the study clearly point out that cryotherapy intervention is effective in reduction of level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.

The reduction of level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis has an important role to play in enabling

effectiveness of cryotherapy intervention as an independent nursing intervention. This can be facilitated by motivating the nurses to,

- ❖ Learn accurate assessment of level of pain during ArterioVenous fistula vein puncture with Standardized Numerical Pain Assessment Scale.
- ❖ Develop sensitivity to the effects of cryotherapy on reduction of level of pain among patients undergoing hemodialysis.
- ❖ Understand the importance of cryotherapy technique intervention as an adjunct to the Pharmacological therapy.
- ❖ Encourage peer use of cryotherapy intervention as a form of diversion among the patients undergoing hemodialysis.
- ❖ Encourage the use of cryotherapy intervention for reduction of level of pain during ArterioVenous fistula vein puncture and to minimize the requirement of pharmacological management.

Nursing Education

Health personnel may separate the theory and practice while treating the patients with pain during ArterioVenous Fistula vein puncture and tend to reduce the level of pain which can be beneficial for the patients. So nursing educators should motivate students to,

- ➢ Ensure that they learn the assessment of pain and effectiveness of cryotherapy intervention in reduction of level of pain during ArterioVenous fistula vein puncture as an independent nursing intervention.

- Provide adequate clinical exposure to the students, where cryotherapy is used in reducing the level of pain during ArterioVenous fistula vein puncture.
- Arrange for participation in demonstrating cryotherapy techniques and by using audio visual aids, group conference and bed side clinics.
- Make available literatures related to cryotherapy techniques in reduction of level of pain during ArterioVenous fistula vein puncture in the library, for student's reference.

Nursing Administration

- Collaborate with hospital authorities in formulating policies to employ the specially qualified nurses in Nephrology ward and periodically supervise their application of cryotherapy intervention.
- Conduct in-service education program on cryotherapy intervention and its application in various fields.
- Provide opportunity for nurses to attend training program on cryotherapy techniques while handling the patients undergoing hemodialysis through ArterioVenous fistula.

Nursing Research

- Encourage further research studies on the effectiveness of cryotherapy intervention in reduction of level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis.
- As it is evident from the review of literature more research needs to be conducted on effectiveness of cryotherapy intervention along with other

routine procedure, in reduction of level of pain during ArterioVenous fistula vein puncture.

- Disseminate the findings through the conferences, seminars publication in professional, national and international journals and World Wide Web.

Recommendations

- ✓ The study can be replicated with large sample size.
- ✓ The study can be conducted on patients with pain due to other types of cannulations.
- ✓ The intervention cryotherapy and its good effects can be taught to all the care givers include family members.
- ✓ A study can be conducted to assess the attitude and practice among nurses posted in hemodialysis unit.
- ✓ Comparative study can be conducted between the cryotherapy with other therapies.

REFERENCES

BOOK REFERENCES

B[1] Ann Marriner Tomey. Martha Raile Alligood. (2006). "NURSING THEORIES AND THEIR WORK" .,(6th ed)., Missouri., Mosby publication.

B[2] Bare, G.Brenda, Smeltzer,C.Suzanne., (2005)., "BRUNNUR AND SUDDARTHS TEXTBOOK OF MEDICAL SURGICAL NURSING".,(10th ed)., Philadelphia., Lippincott Publication.

B[3] Basavanthappa, B.T., (2003)., "NURSING RESERCH"., (1st ed)., New Delhi., Jaypee brothers medical publishers (pvt) Ltd.

B[4] Black,M.Joyce and Jane Hokanson Hawks., (2011)., "TEXT BOOK OF MEDICAL SURGICAL NURSING"., Philadelphia., W.B.Saunders Company publication.

B[5] Christensen. Kockrow. (2006)., "FOUNDATION AND ADULD HEALTH NURSING"., (5th ed) Philadelhia: Mosby Elsevier publications.

B[6] Donna D. Ignatavicius et al., (1991) "MEDICAL SURGICAL NURSING ACROSS THE HEALTH CARE CONTINUUM" (3rd ed)., Philadelhia., W.B.Saunders publication.

B[7] Dorathy, et al., (1995)., "FUNDAMENTALS OF NURSING RESEARCH"., (2nd ed)., USA, Jones and Bartlet publication.

B[8] Gupta, G.S. Kappor., (1990) "FUNDAMENTALS OF MATHEMATICAL STATISTICS" (1st ed) New Delhi., Sultan Chand Publication.

B[9] Kothari, (1990)., "RESEARCH METHODS AND TECHNIQUES" (2nd ed) New Delhi, Wishwa Prakash publication.

B[10] Kothari, C.R. (2004) "RESEARCH METHODOLOGY METHODS AND TECHNIQUES. (3rd ed)., New Delhi, New age International (p) Ltd publishers.

B[11] Lewis Sharon, M. Darkson Shannon Idolia, C. and Heitkemper, M.M. (2004). "MEDICAL AND SURGICAL NURSING. (6th ed) Missouri: Mosby publication.

B[12] Mahajan, B.K, (1991), "METHODS IN BIOSTATISTIES"., (5th ed) New Delhi ., Jaypee Brothers medical publishers.

B[13] Nancy Burns. Susan, K. Groove., (2005)., "THE PRACTICE OF NURSING RESEARCH., (5th ed)., Missouri., Elsevier saunser publications.

B[14] Polit and Beck., (2004)., "NURSING RESEARCH PRINCIPLES AND METHODS., (7th ed) Philadelphia., Lippincott Williams and Wilkins company.

B[15] Polit, F. Denise Hungler., (2001)., "NURSING RESEARCH PRINCIPLES AND METHODS"., (5th ed) Philadelphia., J.B., Lippincott publication.

B[16] Sundar Rao, P.S.S., and Richard., (2004)., "AN INTRODUCTION TO BIOSTATISTICS"., (3rd ed) New Delhi., Prentice-Hall of India Private Ltd.

B[17] Wesley, L. Ruby., (1992)., "NURSING THEORIES AND MODELS"., (2nd ed)., Pennsylvania., Spring House publication.

B[18] Wilma, J. Phipps., (2010)., "MEDICAL SURGICAL NURSING"., (7th ed)., North Carolina: B.J.Publishers.

JOURNAL REFERENCES

J[1] Algply A.A,Geroge.K.P., "The effect of Cryotherapy on pain tolerance" BRITISH JOURNAL of sports medicine, June, volume $4_{1,}$ No-6,2013.

J[2] Amin A, "The effect of Cryotherapy on nerve conducted on velocity, pain Threshold" BRITISH JOURNAL of sports medicine, August volume-14, No-12, 2015.

J[3] Arikan OK et al., "Cryotherapy on recurrent aphthor stomatitis" ORAL SURGERIES, January, Volume – 101, No-1,2016.

J[4] Braun KP "Effect of Cryotherapy in rheumatic disease" Virtual Library, March; Volume-104, No-3,@009.

J[5] Chou Sy, Liu H.E, "Comparison of dry and moist chemotherapy" JOURNAL OF CLINICAL NURSING, July, Volume-17, No-13,2014.

J[6] Ebum L Bamgboye, "prevention treatment of Renal disease" KIDNEY INTERNATIONAL, Volume 63, 2013.

J[7] Gore JL, et al., "percutaneous cryotherapy opn renal tumors" JOURNAL OF ENDOSCOPY, May, Volume-19, No-4,2015.

J[8] Laureano Fileno.J.R,et.al., "Effect of the cryotherapy on reduction of pain after third molar extraction" JOURNAL OF AMERICAN DENTAL ASSOCIATION, June, Volume-136, No-6,2012.

J[9] Okek-Z, et al., "Cryotherapy of the nephrostomy tract" JOURNAL OF ENDOSCOPY, March, Volume-23,No-3,2014.

J[10] Povvell T. et al., “Laparoscope Renal Cryotherapy” MINERVA UROLOGY AND NEPHROLOGY”, June, Volume-57, No-2, 2015.

J[11] Shin y.s et al., “Effect of Cryotherapy on Pain, eye lid edema and facial Echymosis after craniotomy” JOURNAL OF CLINICAL NURSING, November, Volume-21,No-18,2013.

J[12] Singh.H, et al., “The Efficiency of Cryotherapy on the postoperative shoulder” JOURNAL OF SHOULDER ELBOW SURGERIES, November, Volume-10 No-6,2011.

J[13] Yasmitsu’ et. al., “The effect of cryotherapy on postoperative care of ligament reconstruction” AMJ OF SPORTS MEDICINE, May, No-27, 2013.

NET REFERENCES

N[1] An evaluation of pain in hemodialysis patients http://www.ncbi.nlm.nih.gov/pubmed

N[2] An evaluation of pain in hemodialysis patients using different validated measurement Scales http://www.revistanefrologia.com/modules

N[3] Cannulation in hemodialysis http://ndt.oxfordjournals.org/cgi/content/gfm

N[4] Chronic pain during hemodialysis http://www.ncbi.nih.gov/ pubmed? term=%22Agllata % 20s%22%5B Author% 5D.

N[5] Cold and Cryotherapy http://www.ncbi.nlm.nih.gov/ pubmed/ 9816398

N[6] Cryotherapy in the treatment of keloids. http://www.ncbi.nlm.nih.gov/pubmed/ 16865862.

N[7] Do you take your kidney http://www.comprehensive-kidney-fact.com

N[8] Effectiveness of Cryotherapy on ArterioVenous Fistula vein puncture related pain on hemodialysis patients. http://www.ncbi.nlm.nih.gov/pmc/articles/pmc

N[9] Evaluation and analysis of chronic pain in chronic hemodialysis patients. http://www.ncbi.nih.gov/pubmed ? term = %22 Skalli%20Z%

N[10] Hoku ice massage. www.medscape.com/ view articles 4624412

N[11] Managing Chronic Kidney Disease in Africa and India. http://www.renalbusiness.com/articles/2009/01

N[12] Multicentre trial of Cryotherapy for retinopathy of prematurity.

http://www.ncbi.nlm.nih.gov/pubmed 11483076

N[13] Pain degree and skin damage during ArterioVenous fistula vein puncture.

http://www.ncbi.nlm.nih.gov/pubmed 15835412

N[14] Pain in hemodialysis patients, prevalence, cause, seventy and management.

N[15] Prevalence of CRF in adults in Delhi, India.

http://ndt.oxfordjournals.org/content/2018/1638 full.

N[16] Prevalence of chronic kidney disease.

http://www.medscape.com/resource/ckd.

N[17] The prevalence of symptoms in end stage renal disease: A systematic Review.

http://www.ackdjournal.org/article/s1548-5595 (06) 00613 -7 abstract.

N[18] The Economics of dialysis in India.

http://pubmedcentralcanadn.ca/artid=1576273

APPENDIX - A

ANNAI MEENAKSHI COLLEGE OF NURSING

Affiliated with the Tamil Nadu Dr. M.G.R Medical University, Chennai.
Approved by the Indian Nursing Council, New Delhi &
Tamil Nadu Nurses and Midwives Council, Chennai.

Madukkarai Market Road,
P.B. No. 4431
Industrial Estate Post,
COIMBATORE - 641 021.
Cell : 94421 75641, 98435 24219

Phone : 0422 - 6562705, 2675641, 2672705,
Fax : 0422 - 2676016
Email : ceandct@gmail.com
Website : www.annaimeenakshi.in

Requisition for Content Validity

Ref. No. *Date :* .....

From

Mr. Jeya Singh. V.,
II year M.Sc., (N)
Annai Meenakshi College of Nursing,
Coimbatore – 21.

To

Respected Sir/Madam,

Sub: Requisition for expert opinion and suggestion for content validity of the tools – Reg.,

I am a student of M.Sc., Nursing II year of Annai Meenakshi College of Nursing, Coimbatore, affiliated to The Tamil Nadu Dr. M.G.R. Medical University, Chennai. As a partial fulfillment of the M.Sc., Nursing programme. I am conducting **"A Study to Assess The Effectiveness Of Cryotherapy On Reducing Level of Pain During ArterioVenous Fistula Vein Puncture Among Client Undergoing Hemodialysis In A Selected Hospital At Kerala.".** I am hereby enclosing the following:

1. Statement and objectives of the study
2. Hypothesis
3. Methodology
4. Cryotherapy Procedure
5. Tool
6. Content Validity certificate.

Herewith I am submitting these for content validity and for expert opinion and possible suggestion. I will be grateful to you and request you to return the same to the undersigned at the earliest possible.

Thanking you,

Yours faithfully,

Place: Coimbatore

Date:

PRINCIPAL
Annai Meenakshi College of Nursing
COIMBATORE-641 021.

APPENDIX - B

ANNAI MEENAKSHI COLLEGE OF NURSING

Affiliated with the Tamil Nadu Dr. M.G.R Medical University, Chennai.
Approved by the Indian Nursing Council, New Delhi &
Tamil Nadu Nurses and Midwives Council, Chennai.

Madukkarai Market Road,
P.B. No. 4431
Industrial Estate Post,
COIMBATORE - 641 021.
Cell : 94421 75641, 98435 24219

Phone : 0422 - 6562705, 2675641, 2672705,
Fax : 0422 - 2676016
Email : ceandct@gmail.com
Website : www.annaimeenakshi.in

Ref. No.

Date : .....

Certificate of Validation

This is to certify that the tools developed by Mr. Jeya Singh.V M.Sc (N) II - Year student of Annai Meenakshi College of Nursing, Coimbatore, Tamil Nadu (Affiliated to The Tamil Nadu Dr. M.G.R. Medical University, Chennai) is validated by undersigned and can proceed with this tool and conduct the main study for dissertation entitled **"A Study to Assess The Effectiveness Of Cryotherapy On Reducing Level of Pain During ArterioVenous Fistula Vein Puncture Among Client Undergoing Hemodialysis In A Selected Hospital At Kerala.".**

Place: Coimbatore

Signature

Date:

APPENDIX - D

MIMS - THANAL
DIALYSIS CENTRE

www.thanalvatakara.com
thanalvatakara@gmail.com

22.12.2017

Vadakara

Sir,

This is to be state that **Mr.Jeya Singh .V** , M.Sc. Nursing II year from Annai Meenakshi College of Nursing , Coimbatore has been given permission to conduct the study on "A Study to Assess The Effectiveness of Cryotherapy on Reducing Level of Pain During ArterioVenous Fistula Vein Puncture Among Client Undergoing Hemodialysis" at Mims Thanal Dialysis centre , Calicut from 01/01/2018 to 17/03/2018.

We extend a warm welcoming gratitude **to Jeya Singh .V** for doing research in our institution

Sincerely

DAYA REHABILITATION TRUST

NIMMYA FRANCIS
ADMINISTRATOR
THANAL
DAYA REHABILITATION TRUST
VADAKARA, REG. No: 09/08

Beach Road, Vatakara-3
Phone: 0496 2513474

President:
Dr. Idrees. V
Ph: 9745336020

General Secretary:
M.K. Mansoor
Ph: 9846085950

Treasurer:
V. Masahir
Ph: 9846088550

APPENDIX - E

Letter seeking consent of subjects for participants in the Study

Respected Sir/Madam,

I am Mr. Jeya Singh. V, I am doing M.Sc(N) II year in Annai Meenakshi College of Nursing. I am doing a research on "A Study to Assess The Effectiveness Of Cryotherapy On Level of Pain During ArterioVenous Fistula Vein Puncture Among Patients Undergoing Hemodialysis In A Selected Hospital At Kerala". I request your cooperation to complete my research. I assure you that you won't get any harm due my research.

I am Mr / Mrs…….. I heard about the effectiveness of Cryotherapy on level of pain during ArterioVenous fistula vein puncture among patients undergoing hemodialysis from Mr. Jeya Singh. V. He explained me about the benefits of this intervention. I agree with this intervention of Cryotherapy and this study project whole heartedly.

Place: Yours Sincerely,

Date:

APPENDIX - C

NAME LIST OF EXPERTS WHO VALIDATED THE TOOL

- Prof. Dr. R. GANDHIMOHAN MD,DM (NEPHRO)

  CONSULTANT NEPHROLOGIST

  REG.54143

  COIMBATORE.

- Mrs. SANTHY PRIYA M.sc(N),

  Professor,

  K.G College of Nursing

  Coimbatore.

- Mr. FRANCIS M.sc(N)

  Professor,

  PPG College of Nursing

  Coimbatore.

- Mrs. UMA MAHESWARI M.sc(N)

  Professor

  PPG College of Nursing,

  Coimbatore.

- Mrs. AKILA M.sc(N)

  Professor

  KMCH College of Nursing,

  Coimbatore.

APPENDIX - F

PART - A

DEMOGRAPHIC VARIABLES

Instruction: The samples are instructed to give an appropriate answer for the questions. The investigator will mark the given answer in the appropriate box.

Sample No: ( )

Date :

1. **Age in Years**
   a) 21–40 ( )
   b) 41-60 ( )
   c) 61–80 ( )

2. **Gender**
   a) Male ( )
   b) Female ( )

3. **Dietary Pattern**
   a) Vegetarian ( )
   b) Mixed diet ( )

4. **Presence of AV Fistula in an arm**
   a) Right arm ( )
   b) Left arm ( )

5. Site of AV Fistula

a) Radio-cephalic-AVF ( )

b) Brachio-cephalic-AVF ( )

c) Brachio-basilic-AVF ( )

6. Duration of Av Fistula use

a) 1- 6 Months ( )

b) 7 -12 Months ( )

c) 13 -18 Months ( )

d) 19 - 24 Months ( )

7. Frequency of attending Dialysis in a Week

a) Twice ( )

b) Thrice ( )

8. Size of cannula used

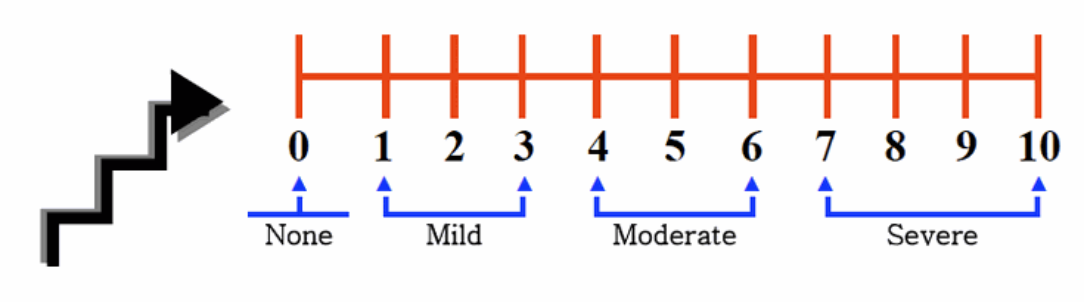
a) 16G ( )

b) 17G ( )

PART – B

STANDARDIZED NUMERICAL PAIN ASSESSMENT SCALE

Instruction: The samples are instructed to give response and touch the number in the scale according to the perception of pain.



Key interpretation:

Score	Level of Pain
0	No pain
1 – 3	Mild pain
4 – 6	Moderate pain
7 – 10	Severe pain

APPENDIX - G

CRYOTHERAPY PROCEDURE

DEFINITION

A Cryotherapy is the local or general use of low temperature in medical therapy or the removal of heat from the body part.

PURPOSES

- To reduce the muscle spasm
- To reduce the pain
- To reduce the inflammation
- To stop the desire to scratch areas that itch

INDICATION

- To reduce pain in Arthritis
- To reduce pain in puncture
- To stop bleeding in injuries

CONTRAINDICATIONS

- Skin being treated with ration therapy
- Severe injury
- A wound in the healing phase
- Areas that have poor circulation

PREPARATION OF THE PATIENT

- Explain the procedure to the patient
- The area to be used should be clean and dry
- Provide privacy

PREPARATION OF THE ARTICLES

- ✓ A bowl with ice cubes
- ✓ Gloves
- ✓ Mackintosh with towel
- ✓ Kidney Tray
- ✓ Isolating screen

PROCEDURE:

ACTION	RATIONALE
1. Explain the procedure to the patient	To gain the cooperation
2. Provide Privacy	To reduce embarrassment
3. Keep all the needed articles ready	To save the time
4. Place the mackintosh with towel above the pillow	To protect the pillow from wetting
5. Place the contra lateral arm over the towel.	For good exposure
6. Fill the glove with ice cubes and start giving ice massage at the web between the thumb and index finger for 10 minute before puncture and continue throughout the puncturing procedure.	To reduce the level of pain during AVF vein puncture.

AFTER PROCEDURE CARE:

Once the procedure over record the pain score in standardized numerical pain assessment scale	To check the effectiveness of Cryotherapy on level of pain during AVF vein puncture
Provide the comfortable position to the patient	To promote comfort.
Replace all the articles	To keep the environment clean
Record the procedure with date, time and patient's response to the procedure.	To protect our self from legal problem

APPENDIX - H

RESEARCHER GIVING CRYOTHERAPY BEFORE AVF VEIN PUNCTURE

RESEARCHER GIVING CRYOTHERAPY DURING AVF VEIN PUNCTURE